### NATIONAL GEOGRAPHIC

2021 THE VEAR IN PICTURES

Some vulnerable species are rebounding, such as gray seals in the Gulf of Maine.

SPECIAL ISSUE



## PICTURES IN PROPERTY OF THE YEAR IN PROPERTY OF THE YEAR IN PARTY OF THE

### COVID

The pandemic put us on a roller coaster: New vaccines spurred optimism, but misinformation and shortages plagued immunizations. As daily routines began to return, the virus still haunted them.

26

### CLIMATE

Massive wildfires, crop-killing drought, record heat, rising seas, intense storms. The alarms about climate change have been sounding for years, but 2021 showed that the crisis truly is upon us.

### CONFLICT

Disputes about culture, politics, borders, and more echoed around the world. The United States faced an unprecedented assault on its democracy and wrestled with the painful legacy of racism.

### CONSERVATION

In a challenged year, there still were victories in efforts to save threatened species, protect oceans, and preserve historic places. The gains bore witness to our commitment—and our hopes.

104

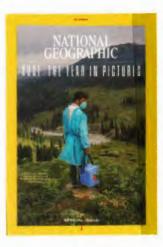
he 2021 "Year in Pictures" issue, our second, feels very different from the first. Many people have called 2020 their most challenging year ever: a pandemic worldwide, racial and political strife in the United States. Yet well into 2021, problems of all kinds persisted; the political rancor and climate crisis did not abate. On the other hand, vaccines and other medical advances, along with behavioral shifts, began to rein in the virus and raise spirits. You'll see that glint of optimism reflected in many of the photographs we chose to represent this whipsaw year.

Yet as we looked through the more than 1.9 million images added to *National Geographic*'s archives in 2021, we couldn't settle on one photo that captured the year. So we created four covers, each reflecting a major theme: COVID, climate, conflict, and—because we're *National Geographic*—conservation.

The four images (right) embody 2021's turbulence: destructive droughts and wildfires ... aid for threatened animals ... a woman traumatized in conflict ... and a health-care worker, Nazir Ahmed, delivering vaccinations. However hard Ahmed's life was in 2021, he kept going, helping others. In an issue full of memorable photos, that one feels especially hopeful.

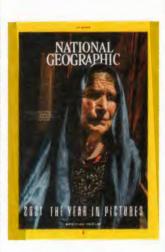
Thank you for reading National Geographic.

Susan Goldberg, Editor in Chief National Geographic



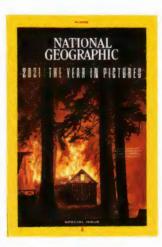
PHOTOGRAPH BY

Health-care worker Nazir Ahmed traveled seven hours in a day, on foot and by car, to take COVID-19 vaccinations to shepherds and nomadic herders in the Indian territory of Jammu and Kashmir.



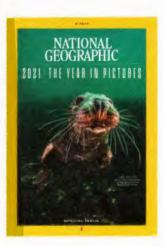
PHOTOGRAPH BY

The war in Afghanistan drove Hafiza, 70, from her village and turned her sons into enemies as they joined opposing sides. U.S. troops left in August; rebel and Taliban forces continued fighting.



PHOTOGRAPH BY

The Caldor fire, which menaced Lake Tahoe, was one of many blazes charring the American West in 2021. Climate change creates hotter weather, drier vegetation, and other wildfire risk factors.



PHOTOGRAPH BY BRIAN SKERRY

A gray seal surfaces in waters off New England. Depleted since the late 1800s by hunting, seal populations rebounded after the enactment of the U.S. Marine Mammal Protection Act in 1972.

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### Introducing ATEM Mini Pro

### The compact television studio that lets you create presentation videos and live streams!

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ATEM Mini's includes everything you need. All the buttons are positioned on the front panel so it's very easy to learn. There are 4 HDMI video inputs for connecting cameras and computers, plus a USB output that looks like a webcam so you can connect to Zoom or Skype. ATEM Software Control for Mac and PC is also included, which allows access to more advanced "broadcast" features!

### **Use Professional Video Effects**

ATEM Mini is really a professional broadcast switcher used by television stations. This means it has professional effects such as a DVE for picture in picture effects commonly used for commentating over a computer slide show. There are titles for presenter names, wipe effects for transitioning between sources and a green screen keyer for replacing backgrounds with graphics.

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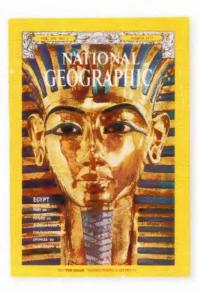
With so many cameras, computers and effects, things can get busy fast! The ATEM Mini Pro model features a "multiview" that lets you see all cameras, titles and program, plus streaming and recording status all on a single TV or monitor. There are even tally indicators to show when a camera is on air! Only ATEM Mini is a true professional television studio in a small compact design!

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### FROM THE NATIONAL GEOGRAPHIC SOCIETY

BY JILL TIEFENTHALER



THE PHOTOGRAPHY OF National Geographic is extraordinarily multifaceted, and therein lies its magic. A single image can spark our curiosity or influence our collective consciousness. I've known this since I was a little girl in Iowa, leafing through the pages of *National Geographic* magazine in my elementary school's library. To this day, I vividly remember the impact of the iconic image of King Tutankhamun's funerary mask on this March 1977 cover. It was a passport to an ancient dynasty, a visual journey of archaeological discovery that ignited my imagination.

Photography was published in *National Geographic* for the first time in 1889, the year after the National Geographic Society and the magazine were created. It's been a tremendous honor to build on this legacy during my first year leading the Society—a year in which enormous global challenges defined a *before* and an *after*. Throughout, we've supported National Geographic Explorers and other journalists around the world whose photographs documented it all—creating an archive of history and human experiences as life fundamentally changed.

Today the Society is one of the largest funders of individual story-tellers in the world. This "Year in Pictures" special issue celebrates honest, evocative images that transcend borders, stir our emotions, and galvanize change. Among them: Stephen Wilkes's field of flags, depicting the devastating toll of COVID-19; Bethany Mollenkof's portraits of remembrance ceremonies, capturing the haunting legacy of racial violence in America; and Thomas Peschak's scenes of Antarctic sea life, spotlighting what's at stake for our planet.

At the Society, we're guided by our mission: to illuminate and protect the wonder of our world. We do that by investing in and

supporting talented scientists, storytellers, and educators from more than 140 nations. They're advancing knowledge and protecting wildlife and wild places. They're documenting urgent threats to our planet and empowering the next generation to help solve problems.

We have a clear vision to drive significant impact—and Explorers are the key. The Society's new strategic plan, NG Next, doubles down on our commitment to Explorers and Explorer-led programs focused on five areas: land, ocean, wildlife, human history and cultures, and human ingenuity. The plan strengthens our investments in tools of exploration, such as photography, and guides us in bringing together Explorers, partners, donors, and others dedicated to our mission of changing the world for the better.

A single image—whether it's the likeness of an ancient pharaoh or a gentoo penguin in a melting Antarctica—can make a lasting impression. It can spur change and even shape history. National Geographic stands ready to record Earth's inspiring scenes for another one and a third centuries—and beyond. 

□





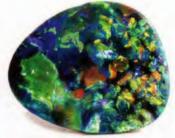
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### YFAR IN PICTURES

### NATIONAL GEOGRAPHIC CONTRIBUTORS

Lynsey Addario
A Pulitzer Prize winner,
Addario has focused on
COVID-19 death rituals in
the U.K. and consequences
of climate change for
women. Pages 2, 54, 74, 92

### Juan Arredondo

In Colombia, Arredondo has looked at how former rebel fighters are reintegrating into society. Page 46

### Javier Aznar González de Rueda

His work showcases the significance of lesser known animals such as reptiles and insects. Page 118

Dan Balilty
As Israel confronted the
pandemic, Balilty trained his
lens on images of daily life
and the country's push to
vaccinate residents. Page 44

### **David Chancellor**

With a focus on Africa, Chancellor scrutinizes the ways humans and wildlife intersect. Pages 57, 114

Alejandro Chaskielberg Based in Buenos Aires, Chaskielberg has photographed places hit hard by natural disasters. Page 16

Alessandro Cinque In Latin America, Cinque investigates the effects of COVID-19 on native populations whose water is tainted by mining operations. Pages 50, 78

### Mel D. Cole

Cole's work ranges from a book on hip-hop to coverage of protests and the U.S. Capitol attack. Page 88

### Dar Yasin

A veteran photographer of conflict and disaster, Dar shared a 2020 Pulitzer Prize for images from contested Kashmir. Page 28

Muhammad Fadli Fadli has covered social issues and COVID-19 in his home country of Indonesia. Pages 32, 40, 48

David Guttenfelder First funded by the National Geographic Society in 2014, Guttenfelder examines the human condition. Page 102

### Tanya Habjouga

Jordan-born Habjouqa specializes in documenting sociopolitical issues across the Middle East. Page 94

### Kiana Hayeri

Hayeri has focused on conflict, often in Afghanistan, where she lives. Pages 2, 18, 82

### Zabi Karimi

Karimi has photographed news events, including the Taliban's takeover of Afghanistan. Page 84

### Lam Yik Fei

An independent photojournalist born in Hong Kong, Lam examines social issues, protests, and crises around Asia. Page 38

### Christopher Lee

Lee's work often explores vulnerable communities and the culture of his home state of Texas. Page 42

### **Henry Leutwyler**

New York City photographer Leutwyler composes portraits and emotionally imbued still lifes. Page 87

Mollenkof Mollenkof Mollenkof recorded her journey as a Black woman navigating pregnancy during COVID-19. Page 100

### Renan Ozturk

An expedition climber and filmmaker, Ozturk has made 360-degree panoramas of Everest. Page 106

Thomas P. Peschak
His wildlife photography
and projections of historical
imagery have highlighted
the dramatic global decline
of seabirds. Pages 66, 76

### Victoria Razo

Based in Veracruz, Mexico, photojournalist Razo focuses on the rights of migrants and women. Page 96

Elliot Ross

As an Arctic Alaska Inupiat community tries to lay plans for a future in the face of climate change, Ross documents the effort. Page 72

### **Moises Saman**

His work from the Middle East and North Africa Includes the book *Discordia*, on the Arab Spring. Page 120



Nairobi photographer Sarah Waiswa observed how the COVID-19 pandemic affected the mental health of people such as Marylize Biubwa (front), who credits her girlfriend for helping her get through it.

PHOTO: SARAH WAISWA

**Robbie Shone** 

To promote the importance of caves, Shone has explored the world's deepest known cave, in the country of Georgia. Page 68

Brian Skerry

Through his films and photography, Skerry has increased awareness of the world's marine ecosystems and the value of conserving them. Page 2

### Jared Soares

Washington, D.C.-based Soares explores community and identity with portraits and photo essays. Page 30

Nichole Sobecki

Sobecki aims to tell the story of scientists and conservationists in the Congo Basin striving to protect this vital rainforest. Pages 70, 116, 124

Brent Stirton
Known for his wildlife

images, Stirton says his goal is to promote "the wellbeing of the planet." Page 22

### Aji Styawan

A project on rising seas reflects the environmental interests of Indonesiabased Styawan. Page 64 Yu Yu Myint Than
Once on the Myanmar

Times staff, Than helped found a women photographers group in Yangon. Pages 98, 99

### Paolo Verzone

Italian native Verzone's photo subjects range from ancient finds to modern technology. Page 122

Ami Vitale

In northern Kenya,
Vitale has documented the
establishment of the first
ever community-run sanctuary for elephants. Page 108

Sarah Waiswa

Waiswa has shared the stories of people struggling with COVID-related mental health issues and access to care in Kenya. This page

Stephen Wilkes

with his "Day to Night" technique, Wilkes created composite images displaying the scope and beauty of bird migration. Page 10

Reuben Wu

Wu is keyboardist for the U.K. band Ladytron, as well as a photographer of drone-lit landscapes. Page 126

The National Geographic Society, committed to illuminating and protecting the wonder of our world, has funded the work of 15 photographers (marked with the yellow border logo) whose images appear in this issue. Learn about those contributors' projects above and at natgeo.org/impact.

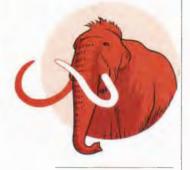
### HIS FUTURE CAN BE YOUR LEGACY

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### THE YEAR IN DISCOUERY

### MILLION-YEAR-OLD

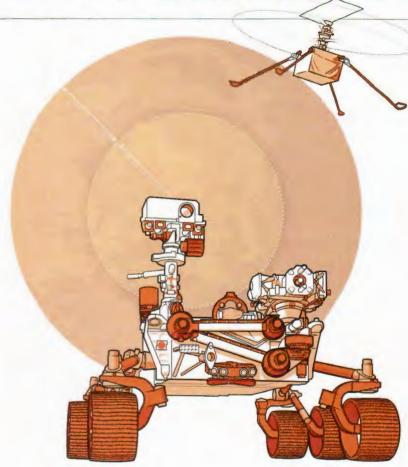
Two mammoth molars more than a million years old yielded the oldest DNA ever sequenced. The discovery hints that with the right conditions, DNA could help scientists unlock evolutionary secrets even further in the past.



### LUXOR'S LOST CITY

A 3,400-year-old metropolis built by Tutankhamun's grandfather was hidden for millennia by Egyptian sands. Found west of modern Luxor, the warren of buildings gives a glimpse of ancient Egyptians' lives at the height of the empire's wealth and power.





### UNDERSTANDING THE RED PLANET

TWO ROBOTIC EXPLORERS touched down on Mars's rusty red surface: NASA's Perseverance rover and China's Zhurong rover. Both have a lofty goal of searching for hints of past life on Mars. Zhurong marks China's first landing on another planet. Perseverance achieved other firsts: On April 19, the rover's onboard helicopter briefly hovered above Mars's surface, logging humankind's first powered, controlled flight on another planet. The next day, rover instruments converted some of Mars's carbon dioxide—rich atmosphere into oxygen—a first that could lead to the creation of rocket fuel or breathable air for future astronauts. Then in September, Perseverance collected the first sample of Mars to be returned to Earth for study, which Los Alamos National Laboratory planetary scientist Nina Lanza says will "change everything for Mars science."

2021 brought important revelations and historic advances in human knowledge, from the microscopic to the cosmic.

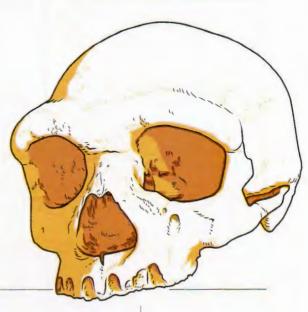
BY MAYA WEI-HAAS AND JASON TREAT
ILLUSTRATIONS BY MATTHEW TWOMBLY

READ MORE ABOUT 2021'S SCIENCE NEWS AND BREAKTHROUGHS AT NGM.COM/JAN2022

### **FILLING OUT OUR** FAMILY TREE

Two fossil discoveries added more kinks in the tangled branches of our human family tree. One's a stunningly well preserved skull-hidden for nearly 90 years in an abandoned well in China-whose mash-up of ancient and modern features suggests it's more closely related to modern humans than even Neanderthals.

Some researchers say the skull may be from a new human species, one they dubbed Homo longi. or the dragon man. Similarly, skull and iaw fragments found in Israel presented scientists with a confusing mix of features. New species or not. both finds show a surprising diversity in our ancient kin.



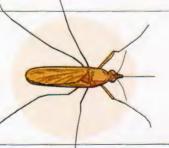
### THE COMPLETE HIIMAN GENOME

Scientists made waves in 2001 with the first draft sequence of the human genome. But headlines celebrating a complete human genome were premature. Despite years of additional work, some 8 percent was still missing-until May 2021, when 99 researchers unveiled what they called the "first truly complete"

sequence of a human genome, spanning 3.055 billion base pairs across 23 chromosomes. The study, which was posted before peer review, adds nearly 200 million base pairs and multiple corrections to prior sequencing efforts. But more work remains: Scientists have yet to sequence the Y chromosome.

### MALARIA VACCINE VICTORY

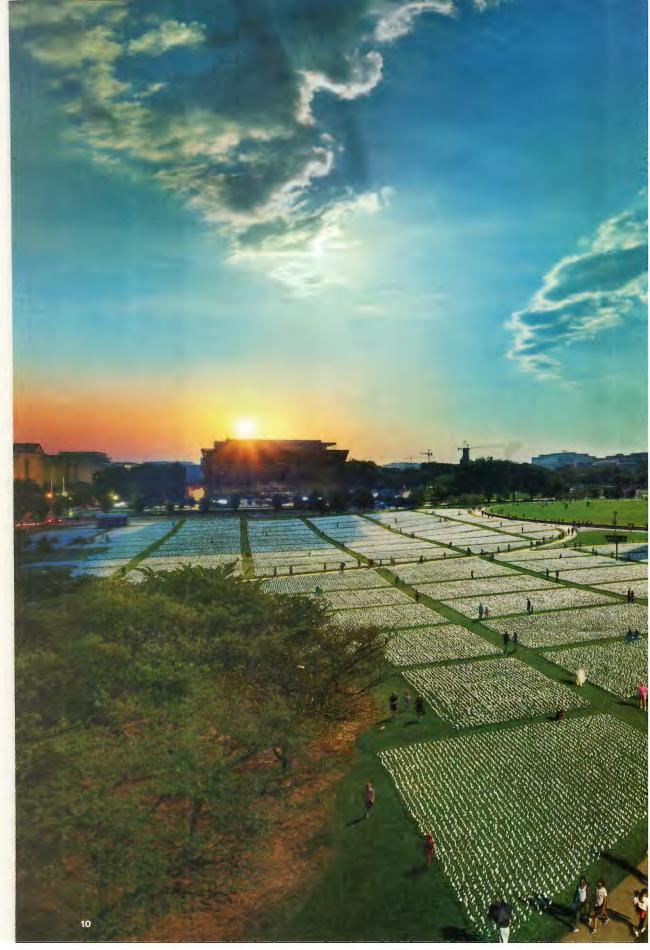
The World Health Organization endorsed the first malaria vaccine, launching a widespread rollout of the lifesaving shots. With a 12-month efficacy of 56 percent in clinical trials, the Mosquirix vaccine won't replace other prevention methods but is a valuable tool in fighting the disease.





### COSMIC COLLISIONS

A billion years ago, a black hole smashed into a dead star-and in January 2020 scientists finally caught it in action. Ten days later, another clash was detected elsewhere in space. Each cosmic collision, reported last June in the Astrophysical Journal Letters, sent out ripples in the fabric of space-time. The study of these gravitational waves is still in its infancy; the collisions suggest there's plenty more to see.



Tahoe. Fadli was in Indonesia, where over the summer the daily COVID-19 infection rate had surged past India's. "My brother-in-law, my father-in-law: COVID," he said. "My sister-in-law: hospitalized for almost 15 days."

And...?

"Everyone survived." Because they were lucky and—probably—because they managed to receive first vaccine doses before they fell ill. The Delta variant crushed India and Indonesia as it rampaged across continents this past year; a dispatch from Jakarta reported 114 Indonesian doctors killed by COVID-19 in one two-anda-half-week period.

Documenting the year inevitably pulled Fadli into scenes of anguish, despair, and loss. But he also made pictures in places where he chose to see hope in the ferocity of human resolve. A city bus station repurposed as a mass vaccination site, crowded to the walls with Indonesians determined to get their shots. A classroom of face-masked children, respectfully dressed in necktie or hijab, their teacher amid the wooden desks with her arms full of schoolwork. Her masked smile shows in her eyes.

This is the second time that National Geographic has dedicated its January issue to photographers' impressions from the just concluded year. In January 2021 the magazine published a visual distillation of the previous 12 months' agitation and grief. Back then it was a relief simply to be done with that "harrowing year," as Editor in Chief Susan Goldberg wrote in the issue, using language more dignified than "Dumpster fire," which was a favored descriptor for 2020 where I live. The coming year seemed to hold so much possibility-the fastest new vaccine development in history, the most ambitious global inoculation plans in history, an international DOCUMENTING THE YEAR
INEVITABLY PULLED OUR
PHOTOGRAPHERS INTO SCENES
OF ANGUISH, DESPAIR, AND
LOSS. BUT THEY ALSO WITNESSED
BEAUTY, RESOLVE, AND HOPE.

consensus that health-care workers and the elderly must be first on the priority lists for protection.

of MANY AMERICANS, that anticipation of 2021's emotional respite endured for ... you know ... a week. Six days, technically. In the section of this issue labeled Conflict, you'll see Mel D. Cole's shoving-melee photograph of January 6—as we now tend to refer to the violent breach of the U.S. Capitol by a mob protesting the 2020 election results that turned President Donald J. Trump out of office. As editors sifted through thousands of photographs from National Geographic's 2021 storytelling, they found their themes (and allitera-

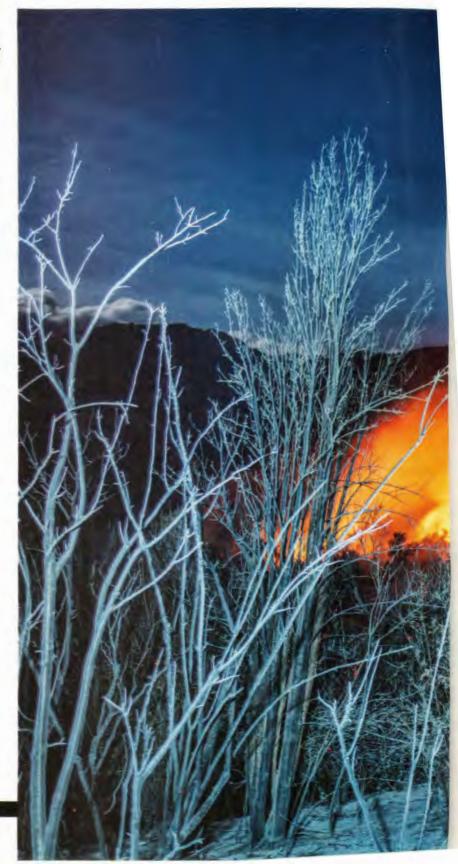
tion): COVID fills another section, as do Climate and Conservation. There's no abundance of respite in these pictures, to be sure. But there is beauty, and resolve, and hope. "Ordinary people," Muhammad Fadli likes to say, "trying to help others."

The lone man in mask and gown, standing above a wooded green valley, is Nazir Ahmed. He's a health-care worker in the Indian territory of Jammu and Kashmir, looking for isolated shepherds to vaccinate against COVID-19.

The woman cradling a baby alpaca is Alina Surquislla Gomez. She works for a Peruvian breeders' cooperative, advising traditional *alpaqueros* whose Andean water and grazing lands are menaced by mining pollution and climate change.

The Kenyan gently laying a gloved hand on a cheetah's flank is a veterinarian named Michael Njoroge; he and the two wildlife specialists with him were part of a five-day effort, involving truck transport and IV hookups and surgeons, to keep a wounded wild animal alive. If you saw the August story on National Geographic's digital platform, which was documented by Nairobi-based

Originally brought to Argentina for timber plantations, non-native pine trees now have grown out of control, creating an environmental tinderbox and an ecologically fragile system in the Patagonia region. Near the town of El Bolsón, a flashlight's beam illuminates some remaining trees of native species-maqui, ciprés, ñire-dusted with ash. Here, as in other spots around the globe, climate change exacerbates factors that create perfect fire conditions.



UNLESS WE MANAGE THE NATURAL WORLD AROUND US BETTER, WE ARE DESTROYING THE VERY FOUNDATION OF OUR LIFE ON THIS PLANET."

-Elliott Harris, UN chief economist



n with a surge of optimism:
ne year of hope and vaccines.
en violent conflicts, a new
f the virus, and deadly
ers of the climate crisis
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ve'd need to ...

## TAY TO MICE

IN JULY 2021 the Indonesian photojournalist Muhammad Fadli drove with his cameras to a cemetery on the Jakarta outskirts and understood, again and more profoundly, how wrong he had been. Over a stretch of weeks during March and April, Fadli had let himself believe that life as he knew it was righting itself: He saw a nationwide inoculation campaign, markets starting to bustle again, malls reopening.

But no. It was like that lull in the horror movies, the brief fake serenity before the thing roars up again. Now in this new burial area, one of six commissioned when the pandemic filled the city's main public cemetery, earthmoving machinery was clearing more ground even as mourners bent over fresh graves.

At the entrance gate, Fadli noted, hearses pulled up every few minutes to deliver the dead. Frequently they converged and had to wait in line for their turn. When drivers swung open their rear doors, Fadli realized that many of the hearses held more than one casket. "Some were carrying four," he told me in early September, and as both of us paused to picture this, our phone conversation momentarily fell silent.

I was at home in California, where five northern counties were aflame and a separate 220,000-acre fire still was advancing toward South Lake



### SEPT. 17-19

### THE PANDEMIC TOLL MOUNTS

Washington, D.C.

PHOTOGRAPH BY STEPHEN WILKES

Planted on parkland around the Washington Monument, the small white flags were both tributes to and symbols of each life lost to COVID-19 in the United States. Artist Suzanne Brennan Firstenberg devised the installation to express the enormity of the national death toll—and also the pain of individual deaths, as mourners deco-rated flags with loved ones' names and photos. During the roughly three weeks that the installation was in place, the U.S. passed a grim milestone: 700,000 COVID fatalities.

To create this composite image, Stephen Wilkes took hundreds of photos from the same vantage point during 30 hours spanning three days. He then merged select photos into this single scene. Learn more about Wilkes's "Day to Night" technique on page 25.

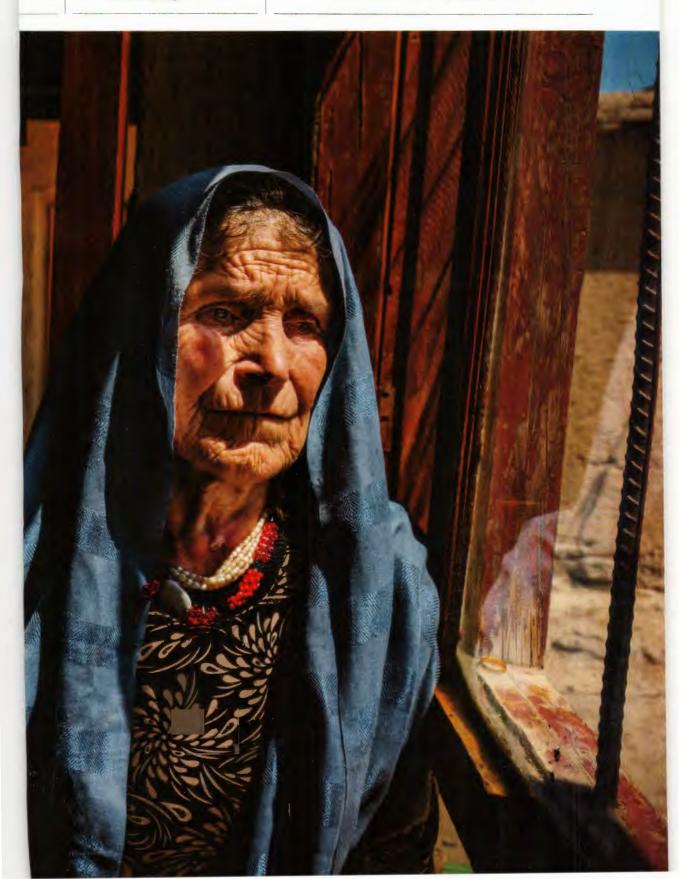
"

IN THE MIDST OF 20 ACRES OF FLAGS, LOVED ONES KNOW THEY ARE NO LONGER MOURNING The U.S. military's withdrawal from Afghanistan in August, after a 20-year occupation, ended what's been called America's longest modern war. But the war there goes on for Hafiza, 70, seen here with a grandson. She has lived near the city of Faizabad since the Taliban took over her home village in 2019. Her sons' choices leave Hafiza grieved and on uncertain ground: Two of them fought with the Afghan National Army, one with a militia, and one with the Taliban. The fighting in Afghanistan was among dozens of ongoing conflicts around the world in 2021-recent to ancient, international to regional, stoked by greed, creed, or history.

44 MY JIGAR GOOSHA [DEAREST OF ALL] ARE ENEMIES OF ONE ANOTHER. I'VE CRIED SO OFTEN, SIGHT OF MY EYES." -Hafiza, speaking of

her sons





photographer Nichole Sobecki, you already know it is cause for turbulence of the heart. So much intention. So much kindness.

Sobecki had been working for months with Rachael Bale, the magazine's animals editor, on their September article about an international animal-smuggling network preying upon Africa's threatened cheetah population. Then a Kenyan guide, with Sobecki along, found an injured adult cheetah amid the brush of a national reserve. For 48 hours the two of them watched over the cheetah while waiting for the Kenya Wildlife Service veterinary team alerted by local rangers.

"One cheetah in one part of the world," Sobecki said, and sighed. On a call between Nairobi and Oakland, California, she and I were trying to figure out how we felt about the push to revive the wounded female, which the rangers had decided to name Nichole. Uplifting and futile, both words apply; Nichole the cheetah did not survive. Her injuries appeared to have been caused by another animal, not a human hunter or smuggler. But Nichole the photographer has been documenting vanishing animal habitats and the climate crisis's toll on Africa, and she was having a hard time disentangling one kind of sorrow from another. "There was a will to try to save that cheetah," Sobecki said. "The efforts were ambitious and sweeping. I don't want to minimize that."

If events had transpired differently, though ... if the Wildlife Service vet had not been off duty the day they found the cheetah or the substitute team had arrived more quickly ... if human behavior hadn't cost cheetahs more than 90 percent of their historic range ... Yes, you could make the case that this particular cheetah was perhaps meant to have expired alone, under a bush, undisturbed by probing hands. But sometimes we fasten on small stories to help us hold bigger ones in our heads.

THIS WAS THE YEAR OF TEXAS'
DEEP FREEZE IN FEBRUARY,
CANADA'S HIGHEST TEMPERATURES
IN RECORDED HISTORY IN JUNE,
AND GERMANY AND BELGIUM'S
LETHAL FLASH FLOODING IN JULY.

"Everybody grows up knowing about cheetahs," Sobecki said. "What about the countless other species that are facing these same issues? If we can allow one of our most celebrated animals to reach a place where there are fewer than 7,000 adults left in the wild, what about everything else?"

No easy delineation separates the images of this year. In 2021 the triumph of COVID-19 vaccine development set off its own discord. (Who knew we could summon such rage over injections to protect us from

death?) Nearly every attempt at conservation-of species, of economies, of spots on Earth—took place against the existential backdrop of climate change. It was August 9 when the United Nations' Intergovernmental Panel on Climate Change released a 2,000-page compilation of bleak assessments and predictions. Its sixth such report in the past two decades, this one was described by UN Secretary-General António Guterres as a "code red for humanity." Less than a week after the report's release, the 220,000-acre Caldor wildfire here in California ignited and spread through drought-parched foothills

while firefighting crews farther north in the state were still exhausting themselves working another megafire, named Dixie.

The Dixie wildfire was the second largest in California history, not fully contained until the end of October. London-based photographer Lynsey Addario has devoted much of her career to capturing images of conflict—these pages include her devastating portrait, from Ethiopia, of a survivor of repeated rape by soldiers. Addario's 2021 summer was spent in California, alongside men and women battling fire.

This was the year of Texas' deepfreeze February, Canada's highesttemperatures-in-recorded-history June, Germany and Belgium's lethalflash-flooding July. "Global weirding" is the term Texas Tech University climate scientist Katharine Hayhoe likes to use in the issue's conversation with National Geographic's Robert Kunzig and Alejandra Borunda and environmental author Katharine Wilkinson. Yes, that's two Dr. Katharines, both exhorting us to refuse despair—and to allow ourselves the possibility, as Wilkinson says, that the present moment might be both a horrifying and a magnificent time to be alive on the planet. "We have so much power," she insists. "There's so much that we can do" to combat climate change. (You can read highlights from their conversation on page 60, and much more of it online at *natgeo.com*.)

As you examine these photos, maybe consider some of the 2021 headlines that did deliver on emotional respite, or at least one genuine moment of OK, breathe, managed to make it through that. The New Orleans levees held, remember? The Caldor fire turned away without

reaching South Lake Tahoe. Until and despite the whack of the Delta variant, millions of us were able to return to the physical company of others—embracing, kissing grandparents, watching children go back to school.

On the following pages, the Howard University graduates, singing and dancing as they stroll together in robes and mortarboards, haul up my spirits every time I look at them. So do the shining South Texas teenage mariachis, buttoned and laced into their new charro suits, riding the bus to performances for the first time since the start of the pandemic.

The baby elephant sucking down bottled formula? Conservation meets COVID, with a surprise happy ending: In a Kenyan sanctuary that houses the elephants, pandemic shipping bottlenecks blocked the powdered milk supply. So the caretakers tried substituting locally available goat milk, and the new formula doubled the orphaned baby elephants' survival rate—to almost 100 percent.

Even a whole "Year in Pictures" issue contains a finite number of pages, of course. An arbitrary partial list of notable people, places, and things from 2021 that are not found in these images: the Tokyo Olympics; private space launches; the sideways-wedged cargo ship blocking the Suez Canal; and the inauguration of the first Black, Asian American, and female U.S. vice president. The presidential assassination and catastrophic earthquake in Haiti. The Perseverance rover rock-boring into Mars. The July 4 week on Massachusetts' Cape Cod, when tens of thousands packed the bars and restaurants of Provincetown, spilling out into the streets, because so many vacationers thought vaccination had finally made it safe.

to, in the dry phrasing of the ensuing Centers for Disease Control and Prevention alert, as "large public gatherings in a town in Barnstable County, Massachusetts." For those of us who'd never had occasion to learn what breakthrough infections were, now we knew: Vaccinated people who traveled home from Provincetown were testing positive for COVID-19. Multistate tracing found only five hospitalizations among the 469 reported cases, and no deaths—so, yes, the vaccine pro-

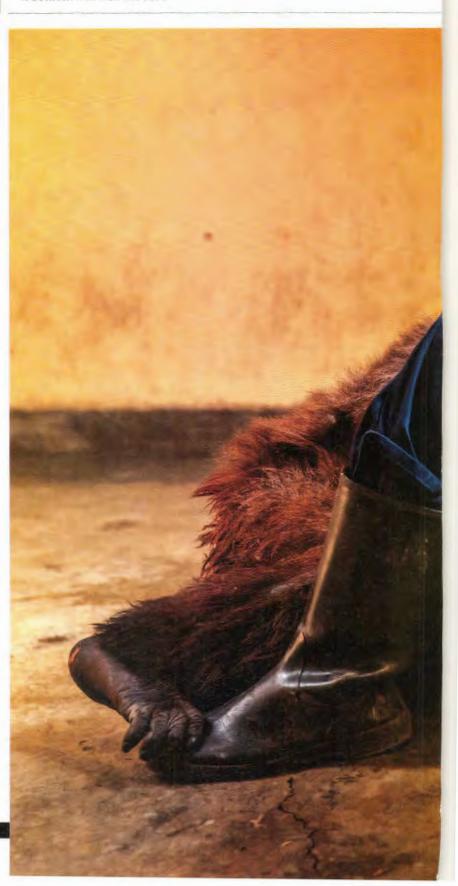
tects. It doesn't entirely prevent transmission, though, meaning no relaxing of our collective vigilance, not yet.

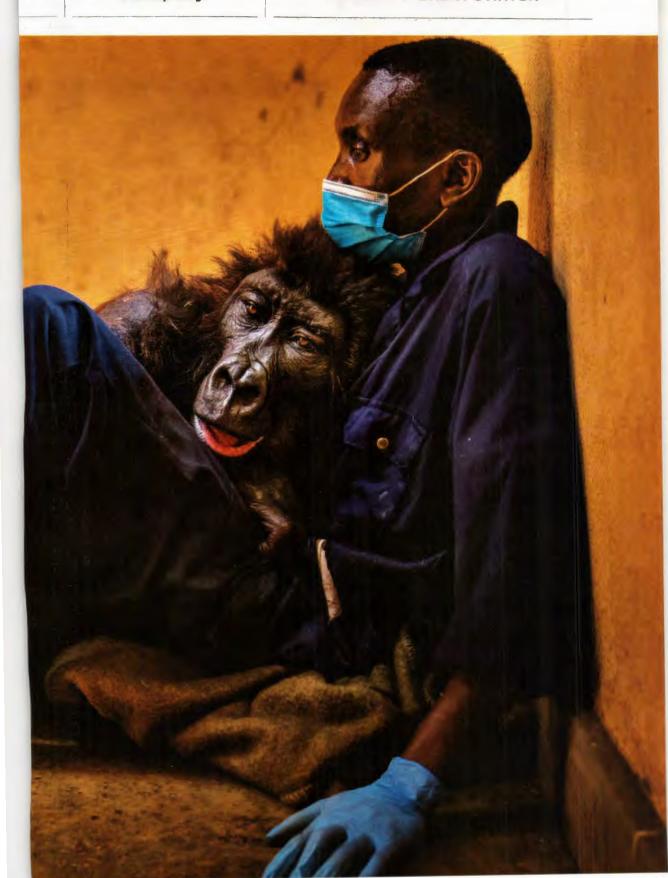
Even in bleak years, conservationists are bright spots. They work to preserve wild places, protect cultural heritage sites, defend threatened species. In the Democratic Republic of the Congo, Virunga National Park rangers pioneered the care of orphaned mountain gorillas. Photographer Brent Stirton was there in 2007 when ranger Andre Bauma found an infant gorilla clinging to her dead mother. He named the orphan Ndakasi-and would be her lifelong caregiver. The rangers built, and still run, an orphanage in Virunga for the gorillas. Stirton visited regularly. He was there in September when Ndakasi, dying of an undiagnosed illness, crawled into Bauma's arms.

VIA GETTY IMAGES

GORILLAS' SOCIETY, IT'S MORE HUMANE THAN OURS. IT'S CARING AND ORDERED, AND THEY LOOK AFTER EVERYBODY IN THEIR FAMILY."

-Brent Stirton, photographer





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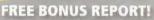
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THE PANDEMIC ISN'T GOING ANYWHERE," SAID A RESTAURATEUR WHOSE BUSINESS HAD CRATERED. "BUT WE'RE NOT GOING ANYWHERE EITHER. WE'RE STRONGER THAN THAT."

"The pandemic isn't going anywhere," Provincetown restaurant owner Rob Anderson said when I called in August to ask how he and others were managing. "But we're not going anywhere either. We're stronger than that. We're still standing."

Like others in town, Anderson watched his business crater in the weeks after the Provincetown breakthrough news, and he suggested I consider the way a tightrope walker reaches the end of each rope. "What do you do? You look ahead," he said. "And you stay balanced. So that's what we do."

This has stayed with me: the tightrope walker. I was thinking about it—how hard 2021 has made us work sometimes, just trying to remain upright—when I called photographer Stephen Wilkes, who as we spoke was shooting the foldout panoramic image that precedes this article. He was 45 feet in the air, photographing from an elevated lift that his crew had been allowed to wheel onto the National Mall in Washington, D.C. When making what Wilkes calls his Day to Night pictures, he works around the clock, taking multiple photos and later merging them into one sweeping image. For this particular Day to Night, he focused for 30 hours on the installation spread across 20 acres at the base of the Washington Monument: white flags, each representing a COVID-19 death in the United States.

"A sea of flags," Wilkes said.

Then he corrected himself. Wait, Wilkes said. Not exactly a sea. "Because of the height I'm at, I can see them almost as individuals," he said. "They remind me of flickering stars."

The artist Suzanne Brennan Firstenberg designed the three-week installation as a giant grid, with open paths to let people walk among the flags, write names on them to remember the dead, and plant new flags as the death toll continued to grow. A large sign at the entrance carried the latest national cumulative numbers, which Firstenberg was updating by hand every day. "When I came yesterday, it was 666,624," Wilkes said. "This afternoon it's..." He hesitated. I imagined him up there on his platform, holding his camera, squinting at the distant number to read it off right.

"670,032," he said.

We did the math in our heads.

In the morning there'd been rain, Wilkes said. "I see an older gentleman, walking through the flags," he said. "I see a woman sitting on the ground. Just planted a flag. She's African American, has this light-green shirt on, she's with—looks like her husband. They're holding hands,"

The afternoon light was doing something remarkable to the monument's shadowing, Wilkes said: luminous on one side, dark on another. "Beautiful," he said. "And it's starting to clear up. It's spectacular, when the sun comes out. Because the white flags just glow."

**Cynthia Gorney** is a *National Geographic* contributing writer. She wrote about toxic wildfire pollution in the April 2021 issue.

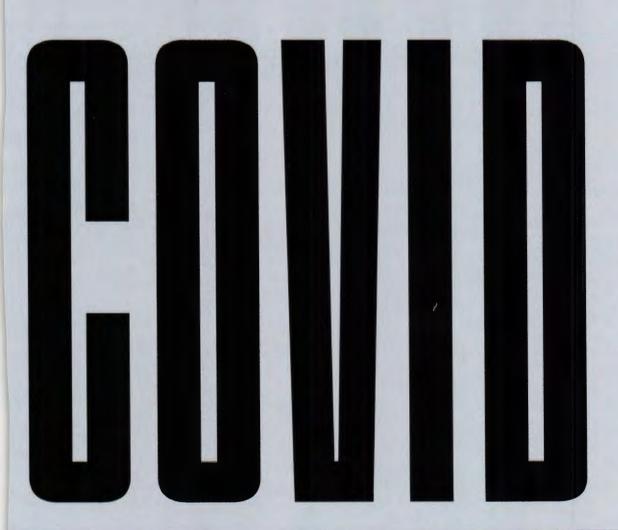
INDIA . DISTRICT OF COLUMBIA . INDONESIA

The pandemic put us on a roller coaster in 2021. New vaccines spurred optimism and reopenings, but immunization efforts were plagued by misinformation and shortages. As the rhythms of daily life return, the virus remains a threat.

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• TAIWAN • TEXAS • ISRAEL • COLOMBIA • PERU



### TAKING VACCINES TO THE COUNTRYSIDE









Brothers of the Phi Beta Sigma fraternity's founding chapter haven't truly graduated from Howard University until they complete a half-century-old tradition: a joyous, choreographed stroll. Passersby "stop—they stop!—because they know the culture, the history," says Travis Xavier Brown (at far right), a 2021 theater graduate. "It's a rite of passage." The pandemic forced Howard to switch to online classes, but as COVID-19 cases fell, the school opted to hold a joint, in-person commencement for the classes of 2020 and 2021.

## TO GET TO STROLL WITH ALL MY BROTHERS-THAT WAS LITERALLY THE FINISHING TOUCH OF MY HOWARD CAREER."

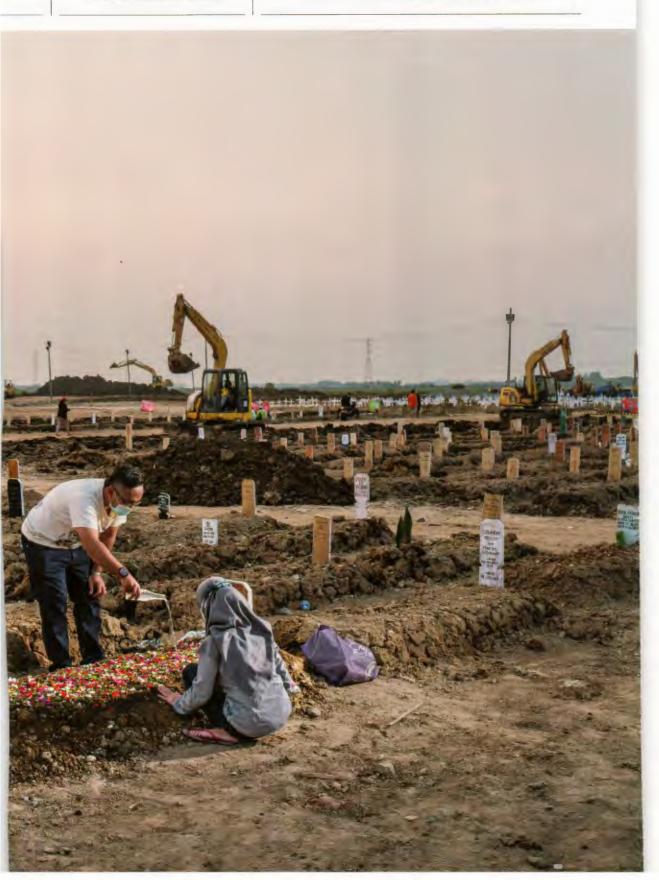
-Travis Xavier Brown, Howard graduate

Relatives pour rose water and offer flowers at a COVID-19 victim's grave in Cilincing, North Jakarta. Rorotan Public Cemetery opened in March with space for 7,200 plots, but it quickly began filling up as Indonesia suffered a huge spike in cases in July. At the peak, the world's fourth most populous country saw an average of 50,000 cases a day.



## PEOPLE DON'T UNDERSTAND WHAT IS GOING ON IN TERMS OF THE SPREAD OF THE VIRUS AND HOW DANGEROUS IT IS."

-Irma Hidayana, co-founder of Indonesian data collective LaporCovid-19





IT WAS SUPPOSED to be a triumphant year, the year we defeated COVID-19. Revolutionary vaccines—developed at breakneck speed from genetic technology decades in the making—were rolling out, ushering in the largest global immunization campaign in history. Lockdowns, isolation, masking, and sparsely attended funerals would give way to open borders, family reunions, and rebounding economies. In 2021 life would return to normal.

What we didn't know, though, was that the vaccination drive would falter. In the United States, millions spurned vaccines despite a deadly winter surge followed by another in the summer. Scientists making discoveries and adjusting recommendations aroused suspicion. Misinformation and snake oil spread as rapidly as the virus. Vaccines were denounced as a form of government control; masks a violation of personal liberty. In much of the world, by contrast, immunizations were simply, tragically, unavailable.

As we squandered the opportunity to reach herd immunity, the virus took advantage. SARS-CoV-2 multiplied, yielding countless mutations. With each genetic change came a chance for the virus to grow deadlier—to dodge the immune system, infect cells more easily, trigger more severe disease, spread across borders. We were at the mercy of high-speed natural selection.

Thus began the rise of the variants: Alpha, in the United Kingdom; Beta, in South Africa; Gamma, in Brazil; and then, from India, Delta.

More infectious and possibly more

Opportunities Lost:
New strains of the virus and uneven responses to vaccines delayed the world's return to normal.

lethal than any of its predecessors, Delta swept through the world's second most populous country with relentless ferocity, overwhelming healthcare workers, packing hospitals with feverish, oxygen-starved patients, and sending bodies to crematoria where funeral pyres blazed around the clock.

By July, Delta was becoming the dominant variant worldwide, and by September, it had pushed U.S. deaths past the toll from the 1918 Spanish flu, making COVID-19 the deadliest pandemic in the nation's history. More than 750,000 Americans had died by early November. But the coronavirus has hit some communities harder: Indigenous, Hispanic, and Black Americans have died at the highest rates.

The pandemic laid bare another glaring health disparity, the global vaccine divide: an abundance of doses in countries where people didn't want them and a shortage, or absence, in those where people did.

Nine months after the first COVID-19 vaccine was authorized, more than 80 percent of all the shots had been given in high- and upper-middle-income countries. While people in poor nations were still waiting for a first one, wealthy nations were approving boosters for vaccinated individuals.

The result: Millions around the world have died from a disease that in most instances can be prevented with a single injection or a two-dose regimen.

Even as vaccines are distributed, we may never be completely rid of this virus. The four coronaviruses that cause the common cold are endemic, as are the viruses descended from the one that sparked the Spanish flu, which killed 50 million people worldwide.

Experts say the SARS-CoV-2 coronavirus most likely will hang around, evolving and circulating for years. But as people develop immunity, outbreaks will be smaller and the virus will cause less acute illness.

We will be stuck not only with the virus but also with a littleunderstood and harrowing legacy: Ten to 30 percent of the hundreds of millions infected may suffer from lingering and potentially debilitating symptoms. So-called long COVID—which includes ailments from brain fog, memory loss, and fatigue to erectile dysfunction and menstrual changes to loss of smell and taste—will require new treatments and therapies.

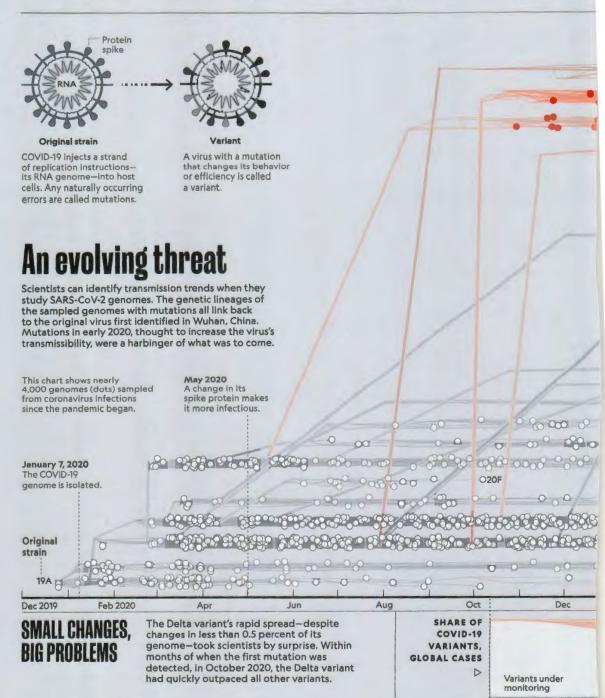
In the meantime, as long as many of us are unprotected, none of us is safe. Unvaccinated people provide a reservoir for new variants to arise. It's imperative both to persuade those who are hesitant to get a vaccine—which provides greater immunity than getting COVID-19—and to deliver vaccines to even the most remote communities. COVAX, a multinational initiative to make COVID-19 vaccines available everywhere, expects to reach the two-billion-dose milestone early this year.

That's a step in the right direction. But as 2021 showed us, and as Delta has taught us, the virus doesn't care about our timeline or our rules.  $\Box$ 

SARS-COV-2 MOST LIKELY WILL EVOLVE AND CIRCULATE FOR YEARS. AS LONG AS MANY OF US ARE UNPROTECTED, NONE OF US IS SAFE.

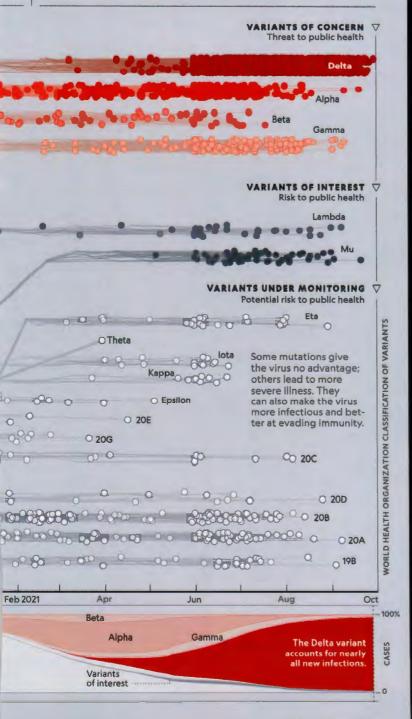
**Bijal P. Trivedi** is a *National Geographic* editor and the author of *Breath from Salt*, which chronicles the quest to cure children with cystic fibrosis—and the dawn of personalized medicine.

### RISE OF THE VARIANTS



Early 2021 brought a glimpse of normal life as COVID-19 vaccines began to be administered. But a new threat was starting to emerge. Slight changes to the virus's genetic code were steering the pandemic in even more dangerous directions.

BY MANUEL CANALES
AND PATRICIA HEALY



## INFECTION AND INEQUITY AROUND THE WORLD

### Contagion

All viruses replicate. Some are highly transmissible, having evolved efficient methods to spread. Human behavior also contributes to local and travel-related transmission.



ORIGINAL STRAIN



DELTA VARIANT

### Vaccine equity

Lower income countries, farmechallenges getting and distributing vaccines, have lower vaccination rates. Until most of the world is immune, public health measures such as testing and masking will remain vital.

SHARE OF PEOPLE WHO HAVE RECEIVED AT LEAST ONE DOSE

High-income countries

Low 2

Upper middle

Lower middle

31

# 6 BILLION NACCINI SHOTS GIVEN

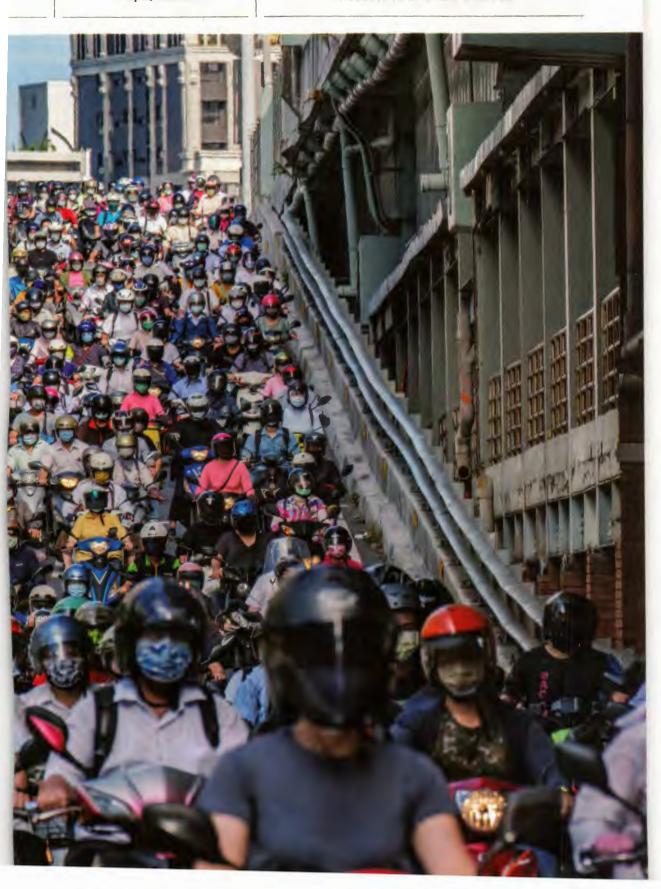
Cooperative global efforts are under way to distribute vaccines more equitably and to boost this number much higher in 2022.

A torrent of rush hour scooters flows off a bridge into Taipei, bringing commuters from nearby Sanchong to the capital. The Alpha variant of SARS-CoV-2 caused a wave of cases from May to July, striking fear in many, but Taiwan was able to tamp down new cases thanks in part to strict quarantine policies and thorough contact tracing. The total case rate is more than 190 times lower in Taiwan than in the United States.



# PEOPLE ARE SIMPLY TRYING SO HARD TO REMAIN [IN] THEIR NORMAL ROUTINE."

-Lam Ylk Fei, photographer



In South Jakarta's Manggarai village, teacher Erdah Desiana at Elementary School No. 1 leads a small group of students. This school was one of hundreds around Jakarta that restarted in-person classes with stringent health protocols. Schools were open three days a week with half the students present one day and the other half there the next. Students at home attended via videoconference. Outbreaks of COVID-19 were still plaguing Indonesia, but the government pushed ahead with in-person school, arguing that the educational benefits outweighed the risks.



### WE HAVE SEEN A DECLINE IN LEARNING ACHIEVEMENT; MANY CHILDREN DROP OUT OF SCHOOL."

-Nadiem Makarim, Indonesia's minister of education and culture

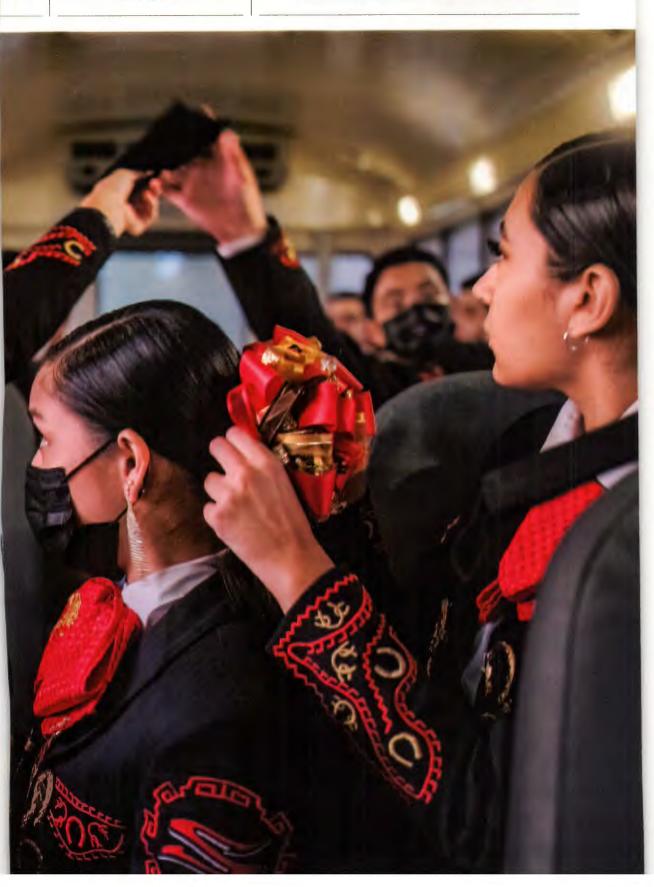


Students Jorge Gutierrez, Montserrat Olvera, and Tiffany Rodriguez dole out face masks and adjust their outfits as they ride the bus with other members of Mariachi Nuevo Cascabel-the varsity mariachi band at Mission's Sharyland High School. The group had gigs at nearby schools to celebrate Hispanic Heritage Month and Mexican Independence Day. The tour marked the band's first live shows since the pandemic began, after a year of virtual rehearsals. Those performances paid off: In October, the students played as the opening act for Mariachi Vargas de Tecalitlán, widely considered the world's best mariachi band.

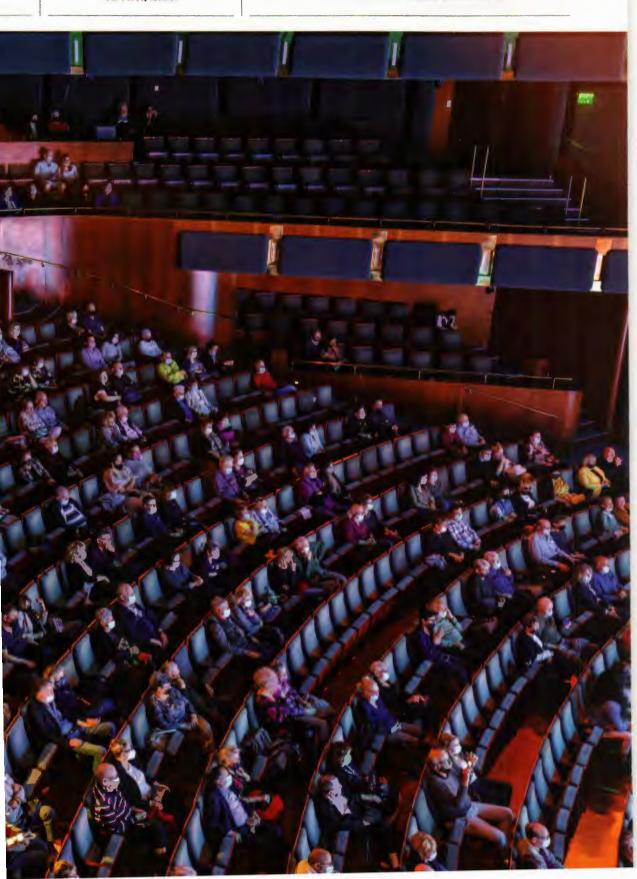


NO MATTER HOW TIRED THEY WERE, THEY STILL WERE HAPPY TO PLAY MUSIC TOGETHER FOR AN AUDIENCE IN REAL LIFE."

-Christopher Lee, photographer







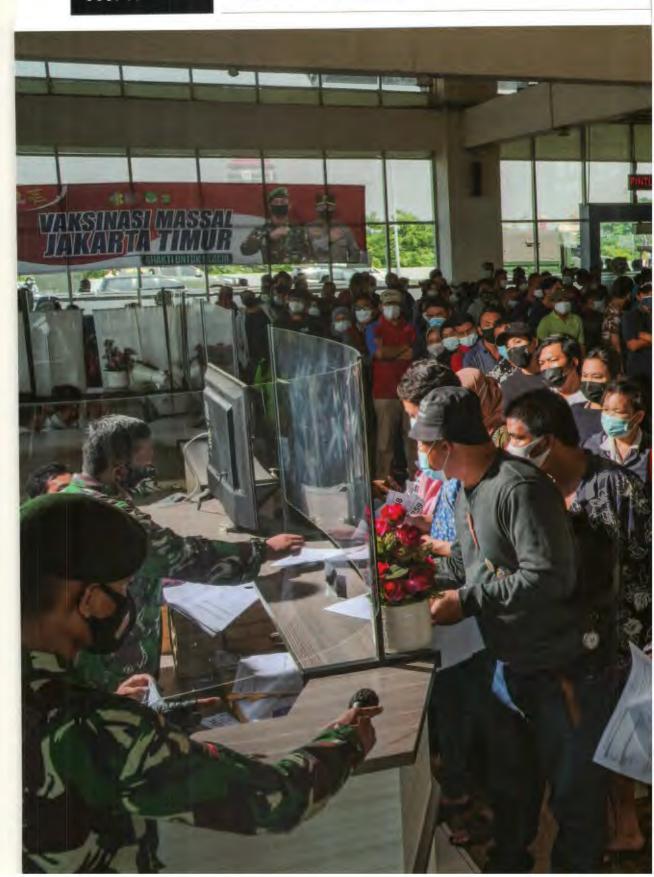
With her son next to her, Marinelly Hernández receives a vitamin infusion while recovering from COVID-19 at the La Guajira reintegration camp, one of 24 built to help former fighters with the Revolutionary **Armed Forces of** Colombia return to society. Since the militants signed a peace deal with the government in 2016, former rebels such as Hernández have reunited with their families at these sites. Fewer than 50 residents of the La Guajira camp were diagnosed with COVID-19, a number possibly kept low because of their relative isolation from the outside population.

LACK OF PROPER TREATMENT HAS FORCED FORMER REBELS TO SEEK TRADITIONAL TREATMENT AND HOMEOPATHIC REMEDIES."

-Juan Arredondo, photographer









Over two days in July, some 10,000 people filed through East Jakarta's packed Pulo Gebang bus station to receive a COVID-19 vaccine. Indonesia has a population of more than 270 million across a far-flung archipelago, so its rollout of COVID-19 vaccines has faced challenges. Kinks in its vaccine supply have also caused problems, but during the summer, the country rapidly ramped up its efforts. More than a million people a day were receiving shots.

THERE WERE PEOPLE LITERALLY EVERYWHERE ...
THE SOCIAL DISTANCING PROTOCOL COULDN'T BE ENFORCED."

 Muhammad Fadli, photographer With a sunset's fading light behind them, workers from a funeral home in Huancavelica wait for the end of a service to move a coffin into a niche at the city's general cemetery. Although COVID-19 death counts are unreliable, Peru has one of the world's highest per capita death tolls. In the rural area around Huancavelica, the pandemic has claimed more than 1,160 lives.

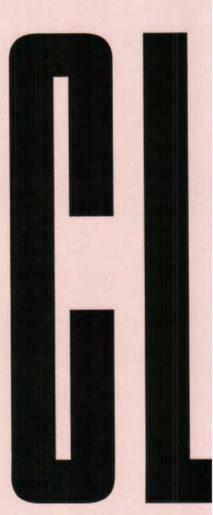


WE HAVE MOVED TO NEARBY CEMETERIES TO HELP ENSURE THAT OUR DECEASED ARE NOT ABANDONED

Manuel Mendizábal,
 Society of Public Charity of Huancavelica



Huge wildfires, drought, record heat, melting glaciers, rising seas, intense storms. The alarms have been sounding for years, but 2021 showed that climate change is here and can't be ignored.



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• COLORADO • ETHIOPIA • SOUTH AFRICA • PERU









## AUG. 26

THE INFERNO IN THE FOREST

**Lassen National Forest, California** 

LYNSEY ADDARIO

Firefighters spent months in 2021 battling to contain California's Dixie fire, which burned nearly a million acres and destroyed most of Greenville, a town of around a thousand. The number and size of wildfires across western North America have increased in recent years, driven in part by climate change, which intensifies hot, dry conditions that suck water from living and dead plants, making them likelier to burn. Part of the solution, scientists agree, is more widespread use of "good" fire: con-trolled, low-intensity burns that clear leaf litter and brush from the forest floor, reducing the fuel for wildfires.

IN THE U.S., WILDFIRES HAVE ON AVERAGE BURNED TWICE AS MUCH LAND PER YEAR IN THE PAST TWO DECADES AS IN THE PREVIOUS TWO.

-National Interagency Fire Center







### A CYCLONE OF LOCUSTS

Lewa Wildlife Conservancy, Kenya

PHOTOGRAPH BY

DAVID CHANCELLOR

- Swarms of locusts descended on East Africa from 2019 into 2021, destroying crops in a region where millions of people are at risk of starvation. The outbreaks were driven by unusually strong cyclones that dumped torrential rains, creating perfect conditions for the insects. The storms, in turn, were fueled by unusually warm waters off East Africa. Climate change, besides warming the whole planet, recently has favored an El Niñolike oscillation that pushes warm waters into the western Indian Ocean, where East African cyclones are born. "I think we can assume there will be more locust outbreaks and upsurges in the Horn of Africa," says Keith Cressman, a desert locust expert with the **UN Food and Agriculture** Organization (FAO).

> PESTICIDES WERE SPRAYED ON MORE THAN FIVE MILLION ACRES IN 2020 AND 2021 TO KILL THE LOCUSTS.

-FAO





'We Just Need More Hands': Climate change's effects are 'horrifying,' but two experts see promise in public action. Struggle to forestall climate change, some moments looked like watersheds at the time. In 1992, with much fanfare, the world's nations signed a treaty in Rio de Janeiro promising action; in 2015, after contentious negotiations, they pledged in Paris to adopt national plans to limit greenhouse gas emissions. Yet global carbon emissions from fossil fuels kept rising—until 2020, when they fell as much as 7 percent as a result of lower fossil fuel usage during COVID-19 lockdowns.

But in 2021 emissions started rising again, and the public conversation about climate change heated up too. In September, after a summer of extreme weather drove destruction and death, a Yale/George Mason University poll found for the first time that a majority of Americans believe they are being harmed by climate change right now.

So does 2021 finally mark a turning point in public opinion on climate? National Geographic reporter Alejandra Borunda and I spoke with two expert observers: Katharine Hayhoe, a climate scientist at Texas Tech University, chief scientist for the Nature Conservancy, and author of Saving Us, and Katharine Wilkinson, a best-selling writer, podcaster, and co-editor (with Ayana Elizabeth Johnson) of All We Can Save, a book of essays on climate by women.

**KUNZIG:** Alejandra, the weather this year kept finding fresh ways to appall us.

**BORUNDA**: It's just a continuation of a trend toward more and more extremes. Here in California, it became

clear pretty early [in 2021] that it was going to be a very dry and probably very hot year. We were seeing streams drying up, baby salmon dying, and people's wells drying up. When the heat started to come, we saw absolutely unprecedented heat waves across the Pacific Northwest. Then, of course, the fires started, which is another thing we've gotten all too used to.

And that's just the American West. Things are happening across the planet: devastating floods in Europe and China that took hundreds of lives and, during Hurricane Ida, from the Gulf Coast all the way to the Northeast. Every year as climate reporters, we're cataloging disasters.

HAYHOE: What we scientists are starting to be able to do is put numbers on how much worse climate change made specific events. The numbers are horrifying. With the deadly floods in Germany, the attribution study showed they were as much as nine times more likely as a result of a changing climate. With the wildfires, with the crazy heat waves out West, those were over 150 times more likely. In my opinion, the best way to talk about what's happening is not global warming—it's global weirding. Things are definitely getting weirder.

**KUNZIG:** Katharine Wilkinson, you've spoken in the past of a "great awakening" of popular opinion. Is it happening?

wilkinson: The gathering intensity of extreme weather events actually parallels what we're seeing in public engagement. My antenna reading is that more and more people are asking, What can I do? How can I help? A lot of my work now is trying to help people become participants in this great transformation.

**KUNZIG:** You once wrote a sentence about all this that really struck me: "It is a magnificent thing to be alive in a moment that matters so much." I often wonder whether as journalists, we convey that excitement. Katharine Hayhoe, do you worry about that?

**HAYHOE:** I worry about it so much that I literally wrote a book all about it: *Saving Us.* With climate change, we're overloaded with doom-filled stories that have very little to do with us, and we dissociate. We think, "Well, I can't do anything to save the polar bears." In reality we need stories about how it's affecting us in ways that we immediately relate to—and then stories about all the amazing solutions that are out there.

But it isn't just up to the media. It's up to all of us. The reason we don't have slavery today, the reason women can vote, the reason the Civil Rights Act passed is because ordinary people decided the world had to change. We have to activate every single one of us.

KUNZIG: What has inspired you lately?

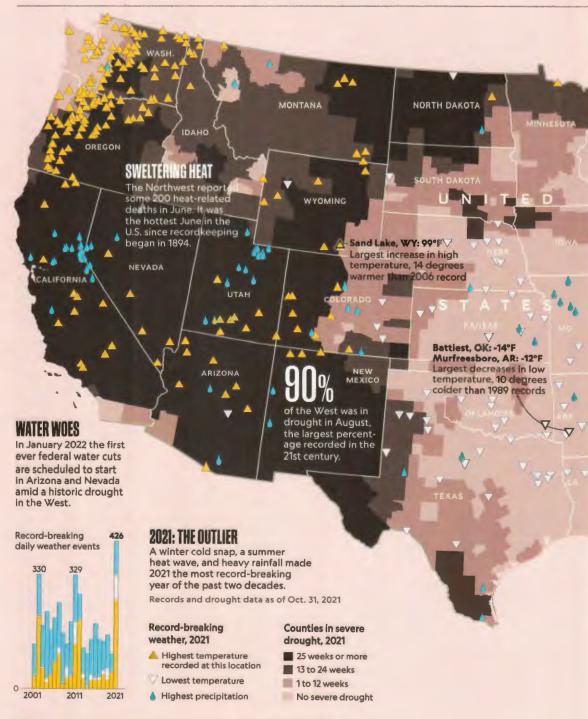
**BORUNDA:** Reporting on shade in Los Angeles. There are some communities that have tons of trees, and there are communities that have very few. I got to spend time with people trying to fix that problem, young people planting trees in their communities who were like, I am doing something here, in a place that matters to me, for people I care about.

HAYHOE: Last year, during the pandemic, there was a virtual science fair. A sixth-grade team from Lubbock, Texas, where I live, won a national competition for a project that looked at how to put carbon back in the soil. They developed an outreach program to talk to local farmers about no-till agriculture and regenerative agricultural practices. If sixth graders from Lubbock could make a difference, could raise awareness that farmers can be heroes when it comes to climate solutions—if they can do it, can't everybody?

And then I look at the macro scale, the fact that during COVID in 2020, 90 percent of new energy installed around the world was clean energy. You realize climate action is not a giant boulder sitting at the bottom of an impossibly steep hill. It is already at the top of the hill. It already has millions of hands on it, pushing that boulder down the hill, in the right direction. We just need more hands.

Robert Kunzig is National Geographic's environment editor.

# A VEAR OF RECORDS



Unprecedented heat, cold, and rainfall crippled infrastructure across the U.S. and led to a major loss of life in 2021. Climate change is now considered the world's greatest threat to human health—and the frequency of related extreme weather events is increasing.

BY MONICA SERRANO, CHRISTINA SHINTANI, AND KELSEY NOWAKOWSKI

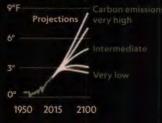
### in estimated damages were caused by a one-week cold snap in the central U.S. in February. **DEADLY FLASH FLOODS** Heavy rainfall in central Tennessee in August caused flash floods, killing at least 20 people. One county reported 17 Ponchatoula, LA: 15 inches inches of rain in one day. Greatest increase in singleday rainfall, 9.3 inches more than 1999 record A DEVASTATING PATH The remnants of Hurricane Ida led to record rainfall. deadly flooding, and more than 50 fatalities in New York, New Jersey, and nearby states. · · Tropical depression - Tropical storm Hurricane

## LOOKING TOWARD A TROUBLED FUTURE

### Inevitable warming

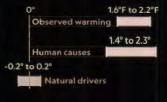
A UN study found that humans have pushed the climate into dangerous new territory. Under even the lowest emissions scenario, the planet likely will warm 2.7 degrees F in the next 20 years.

Global surface temperature increase



### Human-driven heating

Emissions linked to human activity are unequivocally responsible for warming the atmosphere, ocean, and land.



#### More areas under threat

A growing number of regions, affected by different extreme weather, will see more events.

Share of affected regions facing increased weather events by 2050°

Extreme heat		96%
Coastal flood		89%
Heavy precipitation		61%
Fire		29%

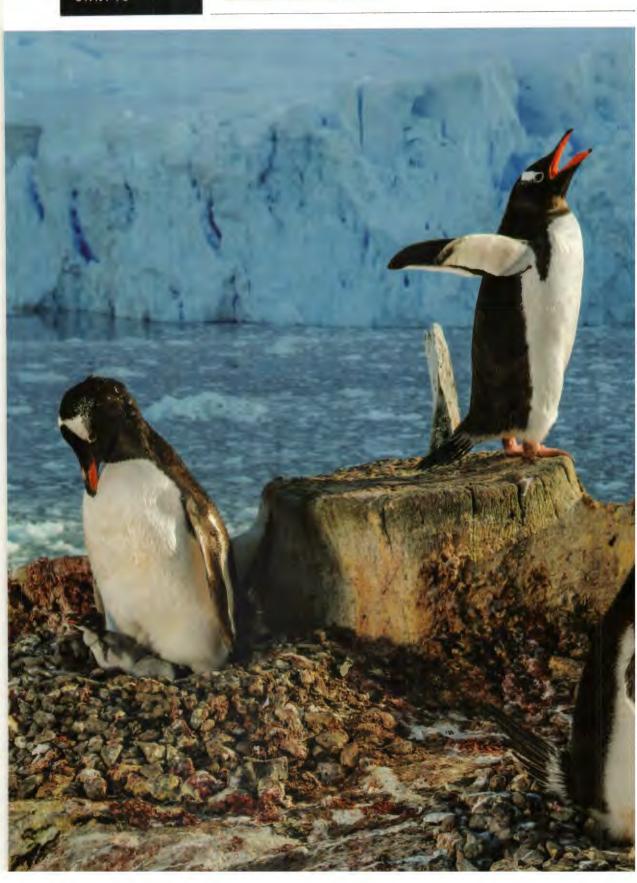
Sali and Yosep watch television while keeping their feet off the flooded floor of their rented home in Demak Regency, on the north coast of Central Java, Indonesia. High tides routinely flood homes in the sprawling municipality, which has lost more than 7,500 acres since 2013 to subsidence and rising seas. The two construction workers were shocked by the flooding when they moved here from West Java in 2018-but they've gotten used to it. By 2050, land that now is home to 23 million people in Indonesia will be flooded annually, a 2019 study estimated.

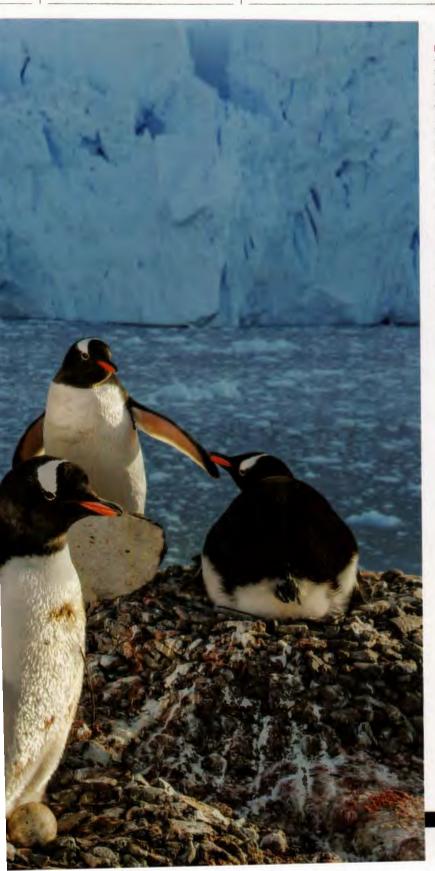


PEOPLE HERE
HAVE ADAPTED—
EVEN THOUGH
THEIR LIVES AND
PROPERTIES ARE
THREATENED BY
THE RISING SEA."

-Aji Styawan, photographer



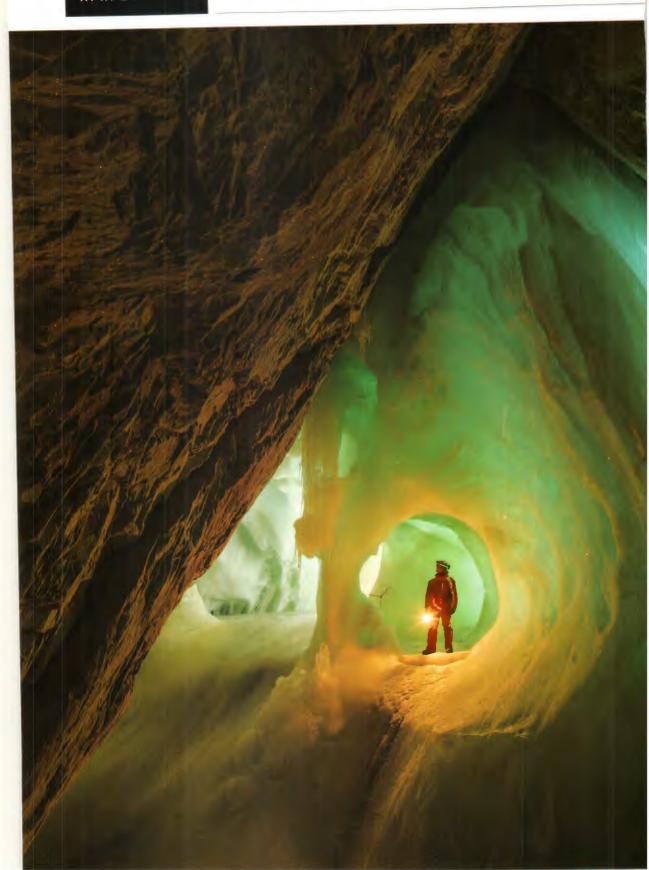




Gentoo penguins on the Antarctic Peninsula nest around an old whale vertebra, a relic of the days when whaling was common in the region. Winter temperatures here have risen a mind-boggling 11 degrees Fahrenheit (six degrees Celsius) since 1950, more than five times the global average. The sea-ice season is now about three months shorter than it used to be. Chinstrap and Adélie penguins, which hunt krill offshore and depend on sea ice, are in decline. But the more flexible gentoos are thriving on ice-free beaches and waters. Their global population has increased sixfold since the 1980s.

### VERY ROUGHLY, YOU LOSE ONE ADÉLIE, YOU LOSE ONE CHINSTRAP, YOU GAIN A GENTOO."

—Tom Hart, penguin biologist, Oxford University





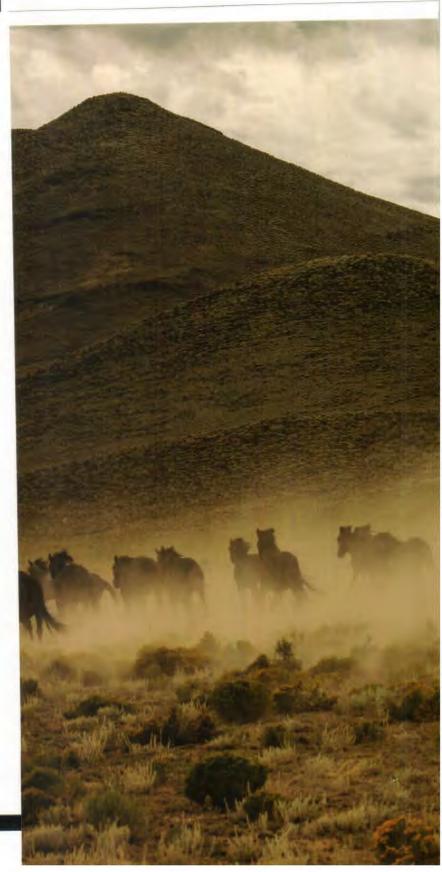
Some of the ice in the 26-mile-long cave system known as Eisriesenwelt-"World of Ice Giants"—could be more than a thousand years old. Ice forms inside because cracks in the ceiling allow snowmelt to trickle into the cave in spring, while warm air rises out, keeping the temperature below freezing. Like glaciers in the Alps, ice caves deep inside mountains are melting as the planet warms. But this one, a major tourist attraction containing more than 30,000 tons of ice, seems to be holding on to its ice for now-perhaps because it has a door at the entrance and extra-large "chimneys" to evacuate warm air.

EVEN IN
OPTIMISTIC
CLIMATE
FORECASTS,
GLACIERS IN THE
ALPS WILL LOSE
TWO-THIRDS OF
THEIR ICE BY 2100.





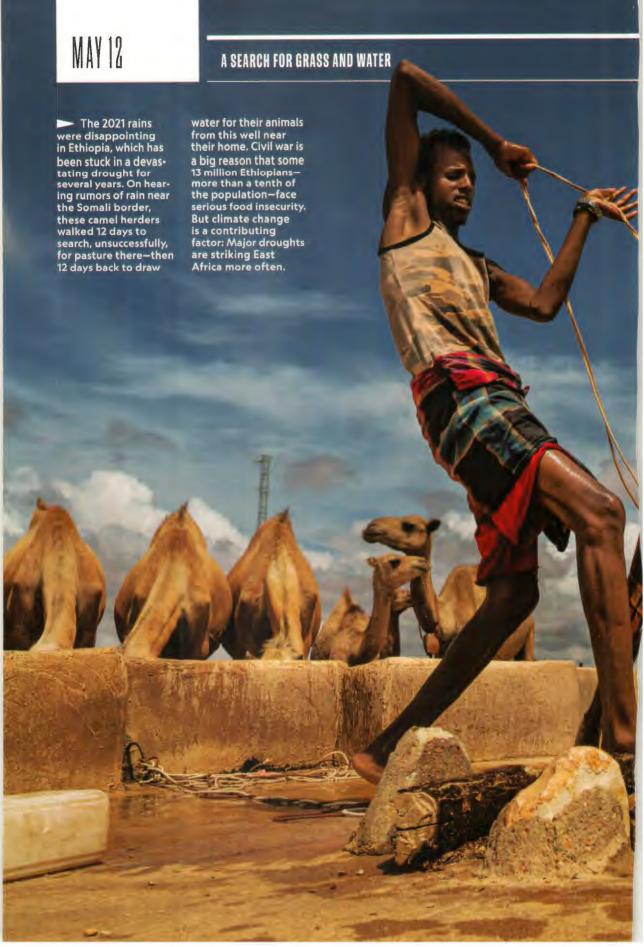
In Colorado, wild horses stampede on land so dry that dust billows up at the slightest touch. The American West recorded an exceptionally hot and dry year in 2021; in the Southwest it was another entry in a 20-year-long "mega-drought" so intense that it rivals any in the past 12 centuries. But "as warm and hot and record-setting as it has been the last few years," says climate scientist Brad Udall, "what you need to keep in mind is, these are some of the coolest temperatures you're going to experience in the next 100 years. Because it's just going to get hotter. You ain't seen nothing yet."

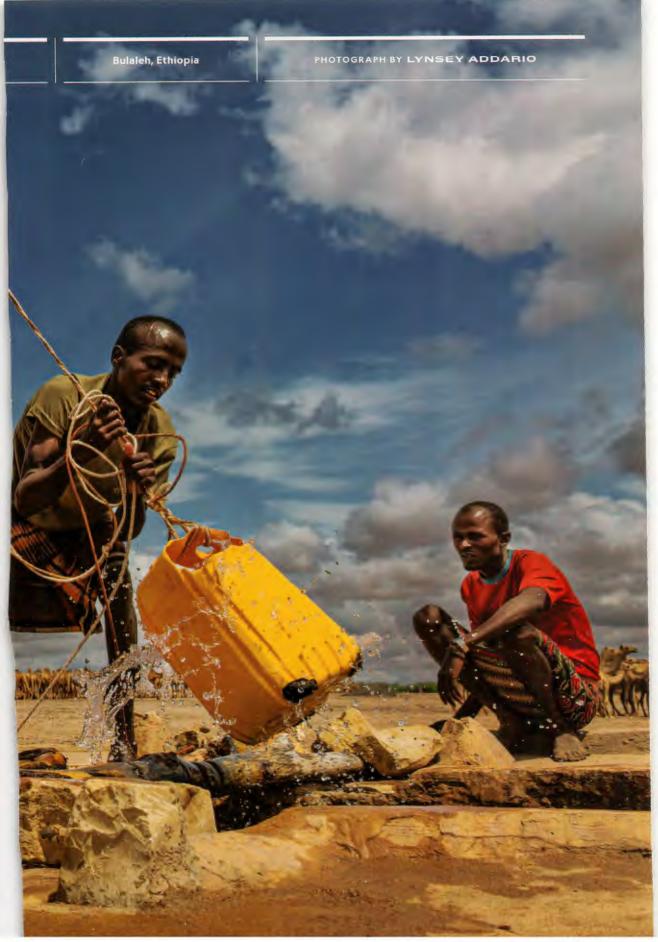


# IT'S REALLY CLIMATE CHANGE THAT PUSHED [THE DROUGHT] TO BE ONE OF THE WORST."

-Ben Cook, climate scientist, Lamont-Doherty Earth Observatory







At dawn, meerkats emerge from their burrows and face the rising sun to warm up-but the Kalahari Desert may be getting too warm for them. As summers in the region get ever hotter, scientists are finding that meerkat pups are growing more slowly and adults dying more quickly, a trend they fear could worsen. It's not just the heat: When rains fail, grasses suffer, ants and termites decline, and insect-eating animals, like meerkats, struggle-an illustration of how climate change can disrupt the delicate ecological balance even in an environment that's already hot.

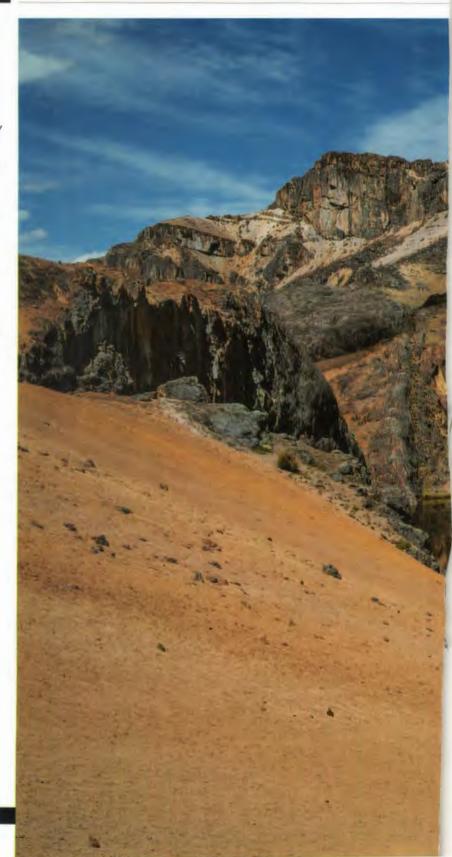


# MEERKATS ARE PERFECT AMBASSADORS. WHO DOES NOT LOVE AND CARE ABOUT THE FATE OF MEERKATS?"

-Thomas P. Peschak, photographer



At an altitude of more than 17,000 feet in the Andes of southern Peru, Alina Surquislla Gomez, a third-generation alpaquera, cradles a baby alpaca on her way to the pastures where her family's herd of more than 300 animals will graze in summer. Shrinking glaciers and increased drought have dried pastures in the Andes, forcing the herders-many of whom are women-to search for new grazing grounds, often in difficult terrain. Prized for their wool, alpacas are important to Peruvian culture and a major source of income in this region, which is home to several million of them.



WHEN I WAS
LITTLE, MY
GRANDFATHER
USED TO TELL ME
HOW BEAUTIFUL IT
WAS TO GRAZE IN
THESE VALLEYS."

-Alina Surquislla Gomez, alpaquera



YEAR IN **PICTURES** 

CHAPTER THREE

AFGHANISTAN . NEW YORK . DISTRICT OF COLUMBIA . ETHIOPIA



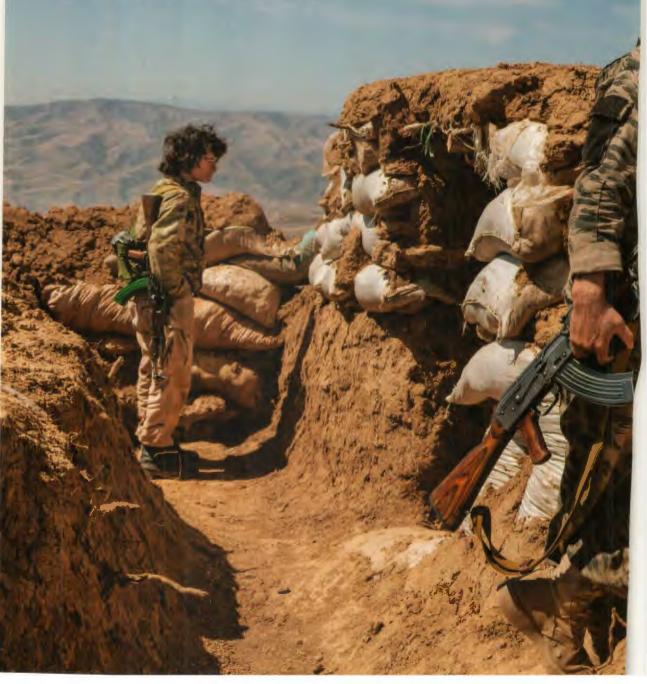


Disputes over culture, politics, land, and more flared around the world-including in the United States, which faced an assault on its democracy and continued to wrestle with the painful legacy of racism.

## TRYING TO HOLD THE LINE

Three months before their deaths, 28-year-old Abdul Wahab (right), a former Taliban fighter, and 17-year-old Farhad, the son of their commander, stood guard at a mud outpost in the Karsai Mountains in northeastern Afghanistan. They were among

the 150 pro-government militia members, many from nearby villages, who spread across Karsai Peak in an attempt to keep the Taliban at bay. On the weekend of July 2, the Taliban overran their positions. Wahab, Farhad, and 17 others were killed. Another 25 men were taken hostage.











## AUG. 15

## RETURN OF THE TALIBAN

Kabul, Afghanistan

ZABI KARIMI

Nearly 20 years after the Taliban were removed from power in Afghanistan by the United States and NATO allies, the Islamist militants regained control of the country. The Taliban takeover was years in the making, yet shockingly swift. On April 14 President Joe Biden announced that U.S. forces would begin withdrawing in May, with all troops out by September 11. By August 15, the Taliban had seized the capital of Kabul, Afghan President Ashraf Ghani had fled the country, and Taliban fighters were crowded behind a massive desk at the presidential palace alongside one of Ghani's former bodyguards (at far left, in business suit). AP PHOTO

FOR 20 YEARS
THE WHOLE WORLD
CAME AND MONEY
POURED IN,
BUT HOW DID IT
HELP US?"

—Haji Adam, a tribal elder in Kandahar Province

### **New York City**

### PHOTOGRAPH BY HENRY LEUTWYLER

A television news video from the morning of September 11, 2001, shows Joe Hunter and other firefighters of FDNY Squad 288, sober-faced and laden with gear, heading to the World Trade Center's south tower to assist evacuations.

When the tower collapsed, Hunter and his squad mates perished. His mangled helmet was found in the wreckage months later. In Hunter's memory, his family donated it to the 9/11 Memorial & Museum in New York, where more than

70,000 objects help tell the stories of victims, responders, and survivors. "It's the only thing we have of him that was down there," says Hunter's sister, Teresa Hunter Labo. Still, she says, it belongs at the museum. This photo was taken on April 13.







## JAN, 06

## **OEMOCRACY ON THE BRINK**

Washington, D.C.

PHOTOGRAPH BY MEL D. COLE

Police officer Michael Fanone struggles against Trump supporters after they dragged him down the steps of the U.S. Capitol. At a rally earlier that day, then President Donald Trump falsely claimed that he'd won the 2020 presidential election "in a landslide" and urged supporters to go to the Capitol, where the House of Representatives was certifying the election results. "You'll never take back our country with weakness," Trump said. Five people died as a result of the attack. Some 140 police officers were injured. More than 600 people have been arrested. The assault on the Capitol is the focus of a congressional investigation.

44

THEY TORTURED ME.
THEY BEAT ME.
I WAS STRUCK WITH A
TASER DEVICE AT THE
BASE OF MY SKULL
NUMEROUS TIMES."

Officer Michael Fanone,
 D.C. Metropolitan Police



Strife and Resilience:

As conflicts old and new raged, the stories of survivors were poignant reminders to learn from history.

**SECRETARY-GENERAL** of the United Nations António Guterres called for an immediate global ceasefire when the pandemic began.

"It is time to put armed conflict on lockdown and focus together on the true fight of our lives," he said.

His plea went unheeded. Even during a public health catastrophe—one that threatened everyone on the planet—conflicts raged.

Two years into the pandemic, dozens of ongoing conflicts blaze around the world. The Armed Conflict Location & Event Data Project reports that since 2016 more than 100,000 people have died each year in tens of thousands of battles, riots, explosions, protests, and violence targeting civilians.

In 2021 the Taliban swept through Afghanistan and back into power after 20 years. Hamas sent rockets into Israel, which responded with air strikes into the Gaza Strip. Ethiopia's war on its northern state of Tigray sowed a deadly famine.

In the United States, insurrectionists stormed the Capitol, and killings by police, especially of Black Americans, drove protesters back into the streets. Haitian migrants escaped strife, hunger, and natural disaster in their homeland, only to encounter violence at the U.S. border.

The details of conflicts vary: They take place in different countries within different cultures, and people fight over different things. In Afghanistan it's the push to remake the country into a conservative Islamic state. In Myanmar, it's the military's unwillingness to cede power. In Israel and the Palestinian territories, to put it simplistically, it's about who can live where. In Ethiopia it's the combustion of years of political resentment. In the United States it's about who has the right to power and safety, as well as the dangers of misinformation.

But the tactics employed in the very worst of the conflicts are similar: widespread violence, starvation, and rape.

Lynsey Addario has been photographing conflicts for more than 20 years in a dozen countries. Rape, as a weapon, is something she has seen throughout the world. The act itself is horrifying, and the fallout destroys communities. That's what it's intended to do. In some places, parents and husbands cast out women who have been raped, and their families are broken.

In Tigray, Eritrean and Ethiopian forces have systematically and brutally raped Tigrayan women. When Addario arrived in May to cover the effects of the war on civilians, she found women who'd escaped from their captors, or been released, and made their way to the shelter of a hospital in the state's capital city of Mekele, then under the national army's control.

"People who have not experienced war may not realize that in every conflict there are moments of peace—little sanctuaries of not quite safety when people can find some rest," Addario says. "These women were in that moment, which gave them the strength and resilience to tell me what had happened to them."

Addario cried as she listened.

"I could not ease their pain," she says. "The only way I could help them—or any of the people I've photographed through the years—is by bringing their stories to the wider world."

"

## NONE OF THE PEOPLE I PHOTOGRAPH ARE VICTIMS. THEY'RE SURVIVORS."

-Lynsey Addario, National Geographic photographer

In the midst of these women's anguish and grief, Addario tried to capture their beauty: "It might seem strange in those circumstances, but beauty invites readers to linger, to try to understand. And it conveys my experience that none of the people I photograph are victims. They're survivors." Her portrait of one of the survivors is on the next page.

The effects of conflict last long after the fighting is over. Scars are left on bodies; frightening memories, in minds. The Tigrayan women Addario photographed will never forget their losses. Neither will anyone else caught in the relentless gears of armed conflict.

Even those separated from conflicts by time or distance still reel from them. Consider two painful remembrances in 2021: the 20th anniversary of the September 11 attacks and the centennial of the Tulsa Race Massacre, when a prosperous Black community in Oklahoma was destroyed by its white neighbors.

As a country, the United States is still reckoning with the aftershocks of these two harrowing events—and with acts of violence throughout the nation's history. Monuments to slave owners who took up arms against the United States in the Civil War—such as Robert E. Lee—are now coming down. The remains of Native American children who died at the boarding schools they were forced to attend are only now being returned to their communities.

But consider too that the moments of stillness between conflict and strife leave room for reflection. How did this happen? How do we stop this from happening again? What more could we have done?

Staff writer **Rachel Hartigan** most recently wrote for the magazine about the crisis in Ethiopia with Lynsey Addario.

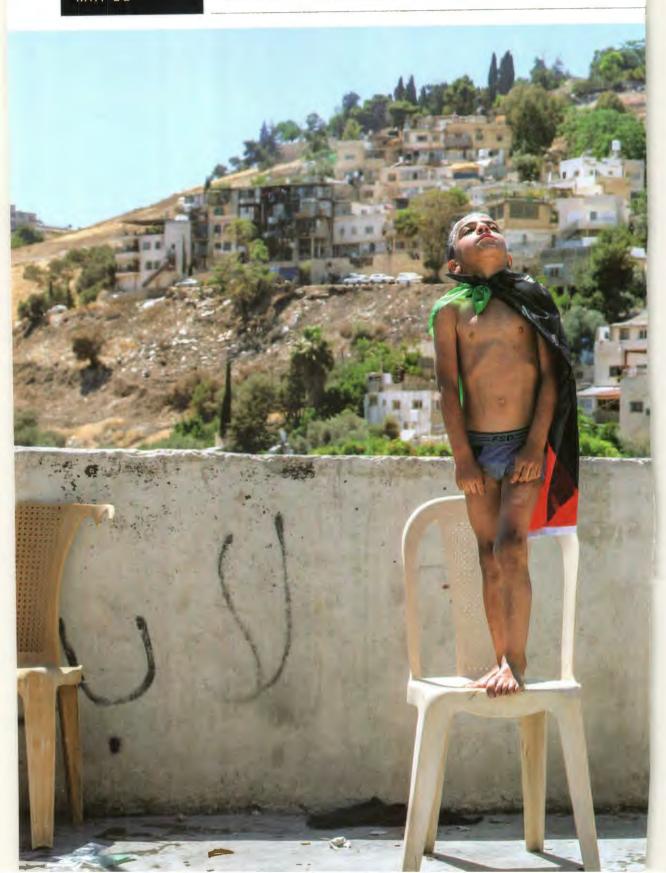




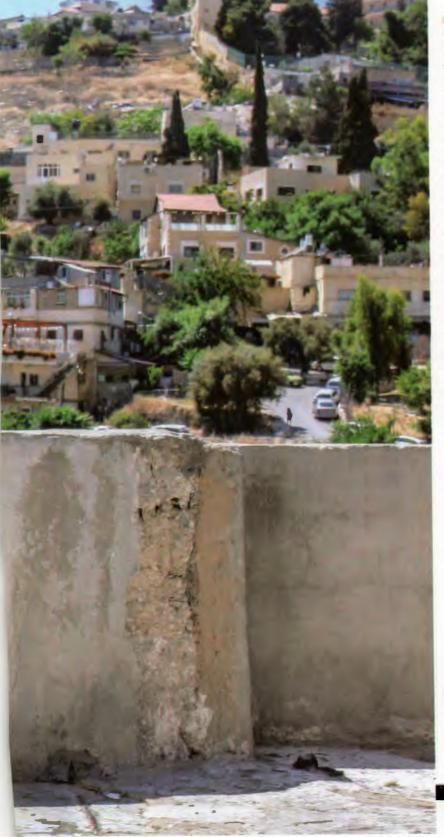
A political dispute between Ethiopian Prime Minister Abiv Ahmed and the Tigray People's Liberation Front, which dominated the federal government for decades, has exploded into war. It's created a humanitarian crisis that threatens the lives of millions of people-especially in the state of Tigray-and the existence of Ethiopia itself, Ethiopian and Eritrean forces, as well as militias from the bordering state of Amhara, invaded Tigray in November 2020, cutting off aid and targeting civilians with particular brutality. This woman says she was raped by 15 Eritrean soldiers in one week, and she doesn't know where her children are: "This is doomsday for me."

## THE SOLDIERS TOLD ME, 'THE TIGRAYAN RACE MUST BE ELIMINATED.'

 Another Tigrayan woman who was raped by soldiers







Thaer al Rajabi, nine, wears a Palestinian flag as a cape while playing on the rooftop where his father, Kayed al Rajabi, set up an inflatable pool to make up for a missed vacation by the sea after Ramadan. "There was too much fear for us to leave our house," says the 34-year-old father of eight. "So I brought them this pool." The Palestinian family faces possible eviction from their home in the Silwan district of East Jerusalem because an Israeli settler organization sued, claiming the land had been owned by a Jewish trust more than a century ago. The United Nations estimates that 970 Palestinians in the city are threatened with eviction due to cases brought mainly by settler organizations.

## 44 I JUST WISH WE DID NOT HAVE

-Kayed al Rajabi, whose family is threatened with eviction





In mid-September 15,000 migrants converged under a bridge at the U.S.-Mexico border in Del Rio. Many were Haitians who had left Haiti for countries in Latin America years ago. Some had heard that the crossing on the Rio Grande was open to immigrants, which it wasn't. Others misunderstood the temporary protected status recently granted to Haitians already in the U.S. and thought it would apply to them. Mounted U.S. Border Patrol agents tried to force migrants back across the river into Mexico. Images of their aggressive tactics provoked outrage and an investigation. The Border Patrol put the agents on administrative duties and temporarily halted horse patrols along the river.

IT EVOKED
IMAGES OF SOME
OF THE WORST
MOMENTS OF
OUR HISTORY."

–Kamala Harris, U.S. vice president





In Myanmar's largest city, members of the LGBTQ community gathered to protest the recent military coup. The leading civilian party had won a November 2020 parliamentary election; the military disputed the results. On February 1, just before the new parliament was to be seated, the military seized control. Tens of thousands of people took to the streets.

Photographer Yu Yu Myint Than superimposed portraits of protesters over images from the protests. Although more than a thousand people have been killed by the junta, resistance to the regime continues. "Rather than being scared, I'm angry," says this 30-year-old businessperson and activist (at left), who is not being identified for their safety.

"I'm a minority from Rakhine state. I've faced discrimination all my life," says this 28-year-old research consultant. "We need a new federal system that gives real power to ethnic minorities. That's what I'm protesting for." The consultant was photographed at a demonstration where people burned copies of Myanmar's 2008 constitution, which gave the military significant political power.





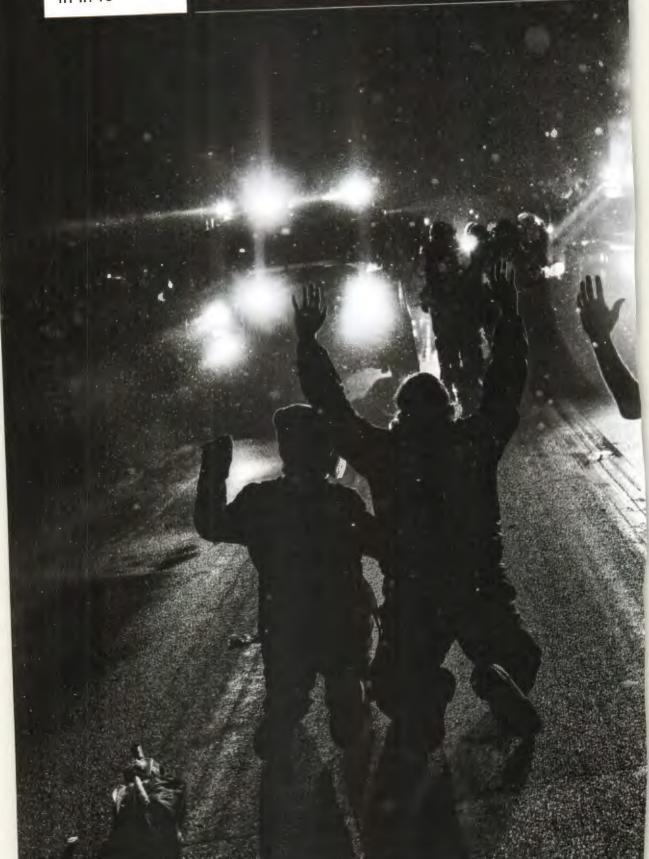


A century after the 1921 Tulsa Race Massacre, a ceremony was held to honor the unknown dead. As many as 300 Black people were killed when whites rampaged through Greenwood, a prosperous Black neighborhood in Tulsa. More than a thousand homes and 141 businesses were destroyed. Nearly 10,000 peoplealmost all of Tulsa's Black population-were left homeless. The potential generational wealth lost-and never repaid-is estimated at \$611 million in today's dollars. Archaeologists have unearthed one mass grave, but the burial places of most victims remain unknown.

## I STILL SEE BLACK MEN BEING SHOT AND BLACK BODIES LYING IN THE STREET. I STILL SMELL SMOKE AND SEE FIRE."

-Viola Fletcher, 107, one of three known living survivors of the Tulsa Race Massacre APR. 13

A CONTINUOUS CYCLE OF VIOLENCE



Brooklyn Center, Minnesota

PHOTOGRAPH BY DAVID GUTTENFELDER

People protesting the shooting death of Daunte Wright kneel outside the police department in Brooklyn Center. Wright, who was Black, was stopped by police for an expired car registration during the nearby trial of former police officer Derek Chauvin, who eventually was

convicted of murdering George Floyd. Wright, 20, had an outstanding warrant, so police moved to detain him. When Wright stepped back into his driver's seat, Officer Kimberly Potter shot him, claiming she mistook her gun for her Taser. She has been charged with manslaughter.

YEAR IN PICTURES

CHAPTER FOUR

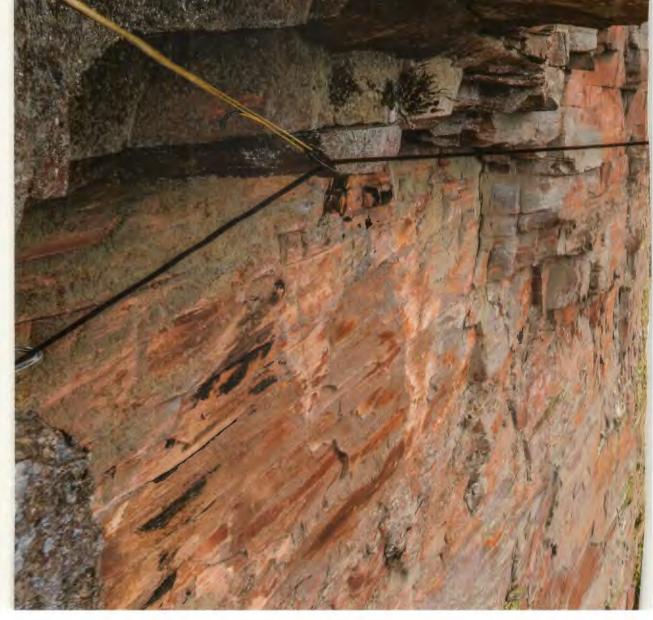
BRAZIL-GUYANA BORDER . KENYA . BOTSWANA

In a year filled with challenges, there were encouraging gains toward preserving natural and cultural treasures. Efforts to save vulnerable species, protect oceans, and honor the past reflected our hopes, and our humanity.

## A RACE AGAINST CLIMATE CHANGE

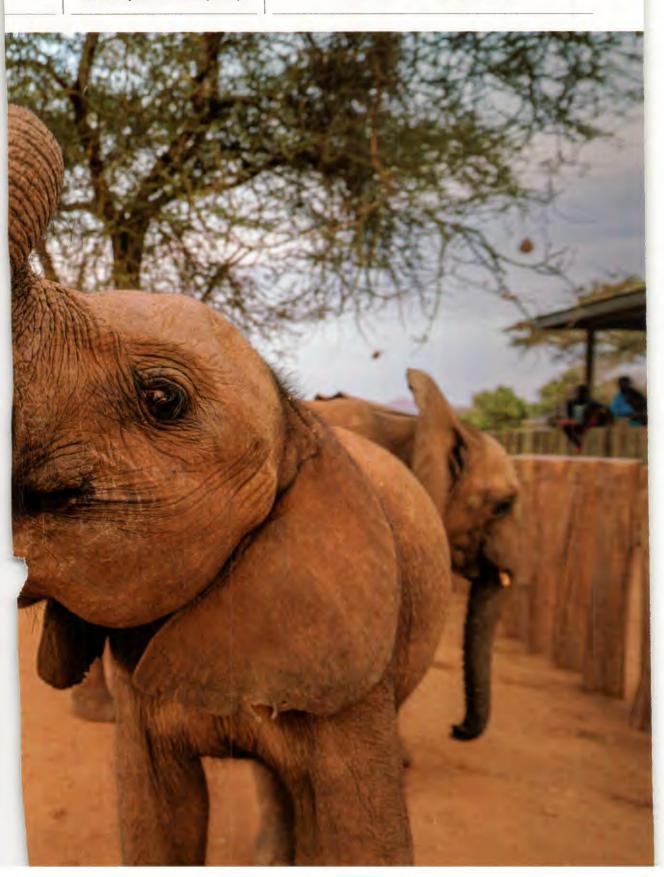
In an ambitious scientific-adventure expedition, Alex Honnold sets the first course up Weiassipu, one of a series of tabletop mountains called tepuis that rise above the jungle at the intersection of Guyana, Brazil, and Venezuela. Millions of years of erosion created these hard-to-reach worlds, where species have evolved in isolation from their

cousins on the tepuis around them. As climate change and chytrid fungus threaten amphibians worldwide, herpetologist and National Geographic Explorer Bruce Means, assisted by Honnold and others, is leading a quest to identify new species here. The aim: to understand how these amphibians have adapted to their ecosystem, before they disappear.











Bright Spots in a Dark Year: Successes in preservation showed a respect for the past, present, and future of our world. AS THE FAMILY of 16 Asian elephants started moving north, no one knew where they were heading, or why. At first, no one thought much about it. Elephants sometimes stray beyond the boundaries of Xishuangbanna National Nature Reserve, in southwestern China's Yunnan Province, but they always return.

Not this time.

Over the course of 16 months they crop-raided, mud-bathed, and road-tripped 300 miles north to the provincial capital of Kunming, a sprawling city of eight million people. Along the way they became global celebrities—and presented a conundrum for government officials. The elephants were racking up about a half million dollars in damage, and there was the ever present risk of an elephant charging a curious onlooker.

The simple answer would be to tranquilize the giant mammals and transport them back to the reserve.

But that would be risky for this group, especially the three calves. Instead, officials mobilized an emergency task force to keep everyone, elephants and humans alike, safe. Drones tracked the elephants' every move. Tons of corn, pineapples, and bananas were used as bait to lure them away from towns. Electric fences, road barriers, and new pathways steered them toward safer routes. These measures ultimately involved tens of thousands of people at a cost equal to hundreds of thousands of dollars.

In a year torn by climate change, conflict, and COVID-19, some might argue that going to extremes to keep a family of elephants safe was wasteful.

IT'S NOT A
ZERO-SUM GAME.
WE CAN PROTECT
ELEPHANTS AND
DEVELOP VACCINES.
WE CAN STABILIZE
STONEHENGE
AND PROVIDE
DISASTER RELIEF.

They might say the same about searching for an undiscovered species of frog on never before climbed mountains, or building new museums, or stuffing mortar into the eroding cracks of Stonehenge's prehistoric megaliths.

But conserving our natural and human heritage—like efforts to cure disease and stop war—is about nurturing good in the world. We need wildlife and ancient artifacts, just as we need health and peace. They're the backdrop against which our lives take place, and they help us make sense of our own stories. They provide the context for our existence. They're our past, present, and future.

It's not a zero-sum game, anyway. We can protect elephants and develop vaccines. We can stabilize Stonehenge and provide disaster relief. The year 2021 is proof of that.

Conservation efforts have been

bright spots in an otherwise dark year. That's not to say the biodiversity crisis has passed. Plant and animal species are still disappearing at an alarming rate; ecosystems are still unraveling. And we must acknowledge the damage inflicted by everything from climate change to bombs on millennia-old historic sites.

But we've also done much to protect the world's heritage. We've moved Atlantic bluefin tuna off the global endangered species list. We've reconsidered plans for oil drilling in an Arctic refuge. We've seen thousands of looted artifacts returned to Iraq and sacred objects given back to the Arrernte people in central Australia, And we've safely persuaded a family of elephants on a long, perilous journey to turn homeward.

"As 2021 comes to an end, I am scared about the state of nature but also hopeful," says National Geographic Explorer Gladys Kalema-Zikusoka, founder and CEO of Conservation Through Public Health. Her group is a Ugandan nonprofit that promotes gorilla conservation, community health, and sustainable livelihoods for people who live near national parks and reserves.

"I am scared because the threats to nature are increasing," she says, but "I am hopeful because the extreme weather patterns we are experiencing and the shock of the COVID-19 pandemic [are] leading to a heightened awareness about these risks and the need to do something about them."

By November the elephants in China had made their way back home and were in good condition, the National Forestry and Grassland Administration said. It's still not clear why they left in the first place, but one theory is that as elephant numbers in Yunnan Province have increased, the animals have needed to expand their territory.

That could be considered good news for this endangered species. But the story of the elephants' trek demonstrates something else too: that the world we created and the world nature created are inextricably bound, for better or for worse.

Rachael Bale is the executive editor of National Geographic's Animals desk. She most recently wrote about cheetah trafficking, for the September 2021 issue.

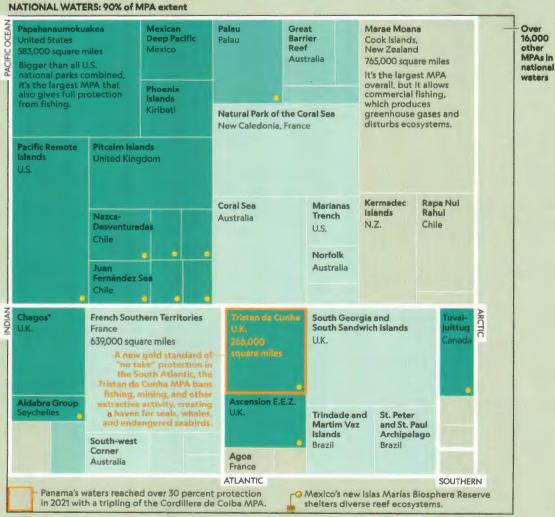
# OCEAN RESCUE

## Safety in numbers

Marine protected areas (MPAs) make up 7.9 percent of the ocean; about 2 percent is fully protected from fishing, a top threat to marine biodiversity. Increased seabed mining and shipping make more protections crucial.

The 50 largest MPAs (below) account for 85 percent of the protected ocean. Most are in national waters; a few are in international seas.





\*THE PRISTINE SEAS PROJECT, LAUNCHED IN 2008 BY THE NATIONAL GEOGRAPHIC SOCIETY, HAS HELPED CREATE 24 MARINE RESERVES. NOT ALL PRISTINE SEAS RESERVES, INCLUDING THOSE WITHIN LARGER MPAS, ARE SHOWN, MPA DATA ARE AS OF OCTOBER 2021. "THE CHAGOS MPA IS AFFECTED BY A SOVEREIGHTY DISPUTE BETWEEN THE UNITED KINGDOM AND MAURITUS."

Ocean conservation has lagged behind efforts on land, but in 2021 there were big gains near shore and at sea.

Aiding that progress was the National Geographic Society's Pristine Seas project, part of a global target to protect at least 30 percent of the ocean by 2030.

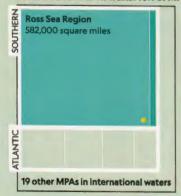
BY LAWSON PARKER

#### **ACTION IN THE ARCTIC**

Protections on the high seas are a multinational challenge, but in 2021 nine nations and the European Union began enforcing a treaty that bans commercial fishing in Arctic international waters for 16 years. Scientists plan to study the region before ice melt can lead to fishing and mining.



#### INTERNATIONAL WATERS: 10% of MPA extent



Central Arctic Ocean Fisheries Agreement 1/1 million equare miles

This doubles the territory protected from fishing in international waters—regions beyond country boundaries that make up 64 percent of the ocean's area.

Trend

needed

## **CAN WE GET TO 30 PERCENT?**

Reaching this goal will require a variety of solutions, including MPAs, international treaties, and the involvement of previously underrepresented groups. The world's 370 million Indigenous people—who oversee lands and waters accounting for 80 percent of Earth's biodiversity—are a growing influence.

ILLUSTRATIONS: MATTHEW TWOMBLY; NGM MAPS. SOURCES: MARINE PROTECTION ATLAS, MARINE CONSERVATION INSTITUTE; PRISTINE SEAS, NATIONAL GEOGRAPHIC SOCIETY; MARINEREGIONS.ORG

# ON LAND, SOME Species are back From the Brink

A million species are at risk of extinction. But 2021 provided promising news for several at-risk species.



#### Jaguar crossings

A National Geographic Explorer captured rare video of a young jaguar, dubbed "El Bonito," on the U.S.-Mexico border. Hunters wiped out U.S. populations, but conservation efforts in Mexico are boosting their numbers, with some returning to U.S. habitats.



#### Grasshopper sparrow soars

The most endangered bird in the continental U.S. was also the first sparrow successfully bred in captivity and released in the wild. The new Florida Wildlife Corridor, supported by the National Geographic Society, protects habitats for both sparrows and panthers.



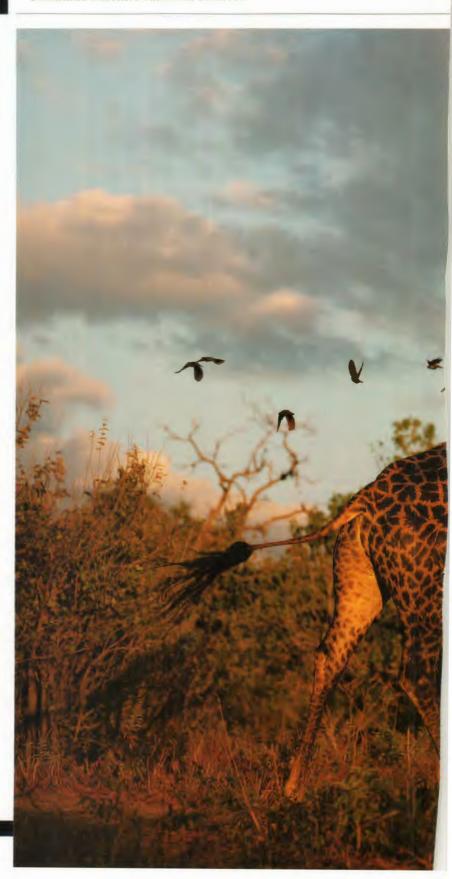
#### Cloning comeback

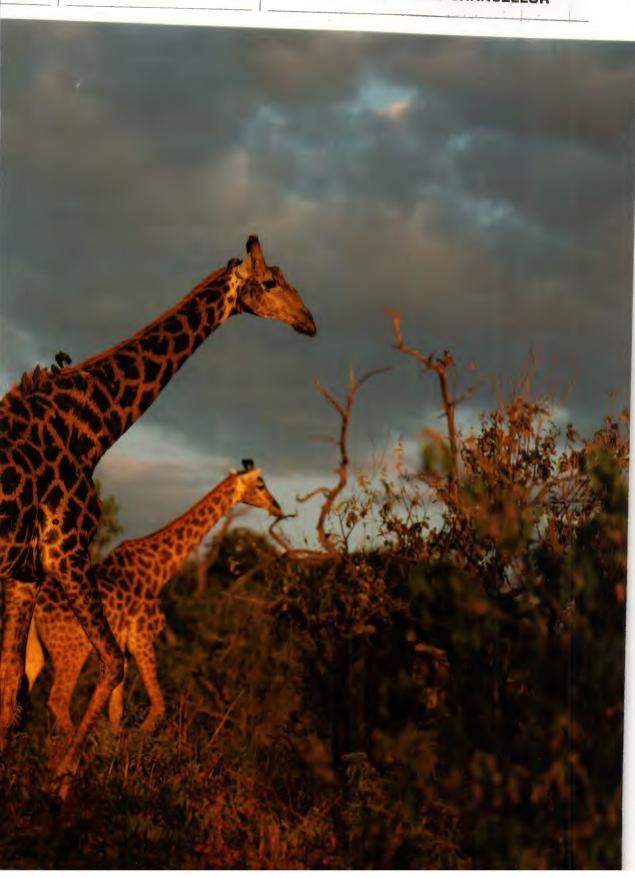
Elizabeth Ann was cloned from the cells of another black-footed ferret preserved for more than 30 years. Overseen by the U.S. Fish and Wildlife Service, the cloning was the first successful replication of a wild, endangered species in North America.

Giraffes move through Chobe National Park, in Botswana, at sunset. Because most giraffe habitats in Africa are outside protected areas, urban development, crop growing, and livestock grazing are isolating the animals into smaller, more fragmented populations. As a result, extinction threatens the world's tallest land mammal, whose numbers are about 68,000 adults and falling.

I AM SCARED
ABOUT THE
STATE OF NATURE
BUT ALSO
HOPEFUL ... NATURE
IS RESILIENT
AND, IF IT [IS]
NOT TAMPERED
WITH, CAN
BOUNCE BACK."
—Gladys Kalema-Tikusoka

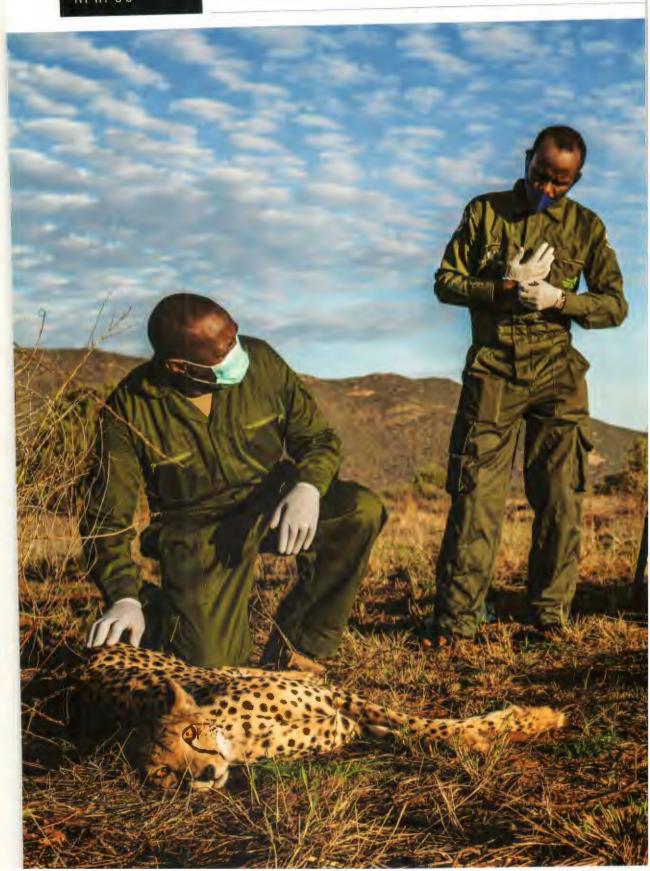
-Gladys Kalema-Zikusoka, National Geographic Explorer and founder of Conservation Through Public Health





APR. 09

THE FIGHT TO SAVE GHEETAHS





- Veterinarian Michael Nioroge (at left), with the Kenya Wildlife Service. examines a nearly unconscious cheetah that likely was injured by another animal. Cosmas Wambua (at right), co-founder of the conservation group Action for Cheetahs in Kenya, and Lialu Lekalaile, a ranger, prepare to assist. The team spent three days trying-unsuccessfullyto save the cheetah. Rangers had named her Nichole, after photographer Nichole Sobecki, a National Geographic Explorer who documented the cat's plight. Fewer than 7.000 adult cheetahs remain in the wild. so conservationists are going to great lengths to help each one survive.

CHEETAHS AREN'T
THE BULLIES
OF THE FELINE
PLAYGROUND.
THEY PURR, NOT
ROAR. THEY AREN'T
DESIGNED TO
FIGHT HARD OR
DEFEND TERRITORY.
AND ALL THIS
CAN LEAVE THEM
VULNERABLE."

 Nichole Sobecki, photographer

## IN DEFENSE OF RATTLESNAKES

An eastern blacktailed rattlesnake sits coiled on a log by the side of a road in the Davis Mountains of West Texas. Rattlesnakes long have been killed indiscriminately in the United States out of fear and misguided hatred. But they're important predators that help control rodent numbers, and rattlesnake venom is studied for potential medical uses—including in cancer and even COVID-19 research.

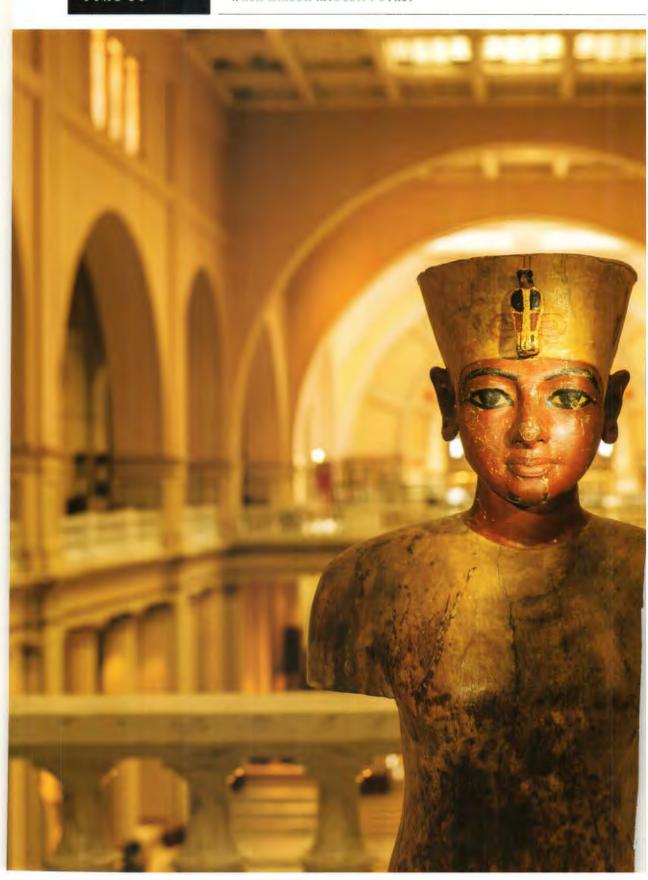


### AN ANCIENT TEMPLE SURVIVES-FOR NOW

Members of a wedding party made up of local tribesmen loyal to Yemen's gov-ernment visit the ruins of the Awwam Temple, in Marib, to take photos. The ancient temple is one of the most important surviving monuments of the Kingdom of Saba, which ruled southern Arabia from about the 11th century B.C. to the third century A.D. and has been linked by some historians to the biblical land of Sheba. The antiquities, on the edge of the most hotly contested part of Yemen, remain at risk as Iran-backed Houthi rebels continue their fight to take over Marib.



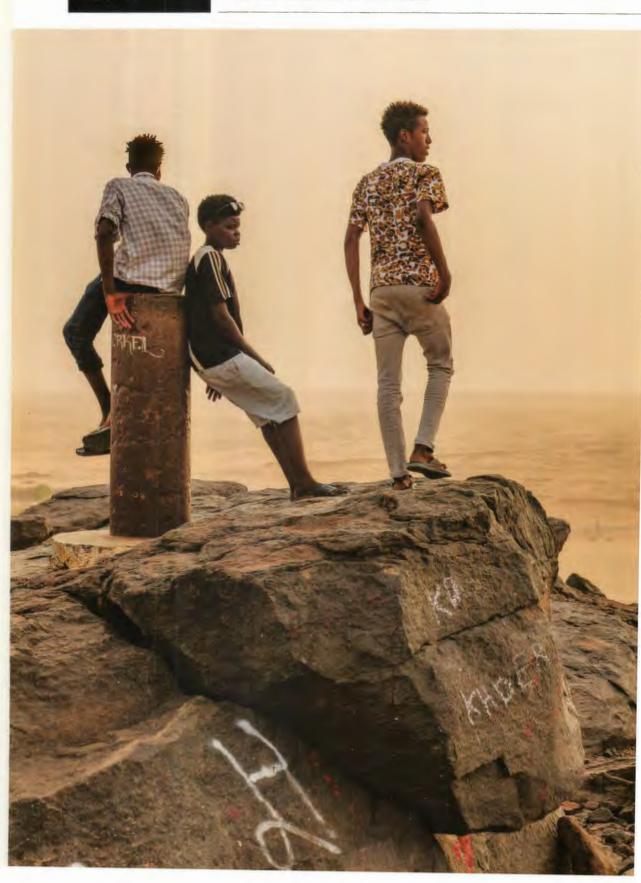






The boyish face of King Tutankhamun greets visitors at the Egyptian Museum, in Cairo. This life-size model, which may have served as a manneguin to display royal robes or iewelry, is one of more than 5,000 treasures from the young pharaoh's tomb that are being restored and prepared for display at the new Grand Egyptian Museum, planned to open in late 2022. An international team of scholars at the museum's conservation laboratory is restoring a steady stream of artifacts from across the country.

OTHER EGYPTIAN
ROYALS ARE
KNOWN TO HAVE
BEEN BURIED IN
THE SAME VALLEY
AS KING TUT, BUT
THEIR TOMBS
AWAIT DISCOVERY.





Sudanese tourists climb Jabal Barkal, a sacred butte overlooking pyramids built during the Kingdom of Kush, which dominated the political and cultural landscape of northeastern Africa from about the eighth century B.C. to the fourth century A.D. A new generation of Sudanese has revived and embraced this ancient history as a unifying force that cuts across diverse ethnic and racial lines as the country emerges from a 30-year dictatorship. However, the military's dissolution of the transitional government in late October threatened Sudan's progress toward stability.

> SUDAN HAS MORE PYRAMIDS THAN EGYPT.





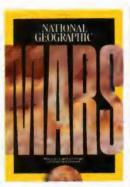
## A LAST LOOK AT 2021



PHOTOGRAPH BY KRIS GRAVES



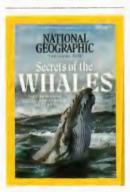
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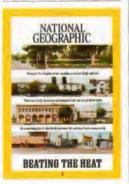
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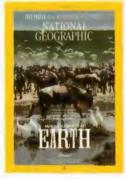
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